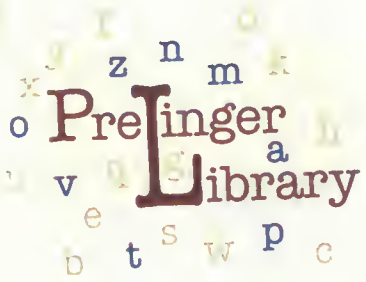
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ELECTRIC RAILWAY JOURNAL

PROTECTION NOARK SERVICE



Here's Our New Home

Floor space of old plant 130,000 square feet. Floor space of new plant 375,000 square feet (and ample room for expansion). Nearly 200% increase. We take this occasion to express our thanks to all our friends and customers who by demanding Johns-Pratt products in ever-increasing volume have made the acquisition of this plant a necessity. With the added facilities it affords, we pledge the continued maintenance of Johns-Pratt standards of quality and our best endeavors for still better service.

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NOARK FUSES AND PROTECTIVE DEVICES VULCABESTON PACKING AND INSULATION JOHNS-PRATT MOLDED PRODUCTS

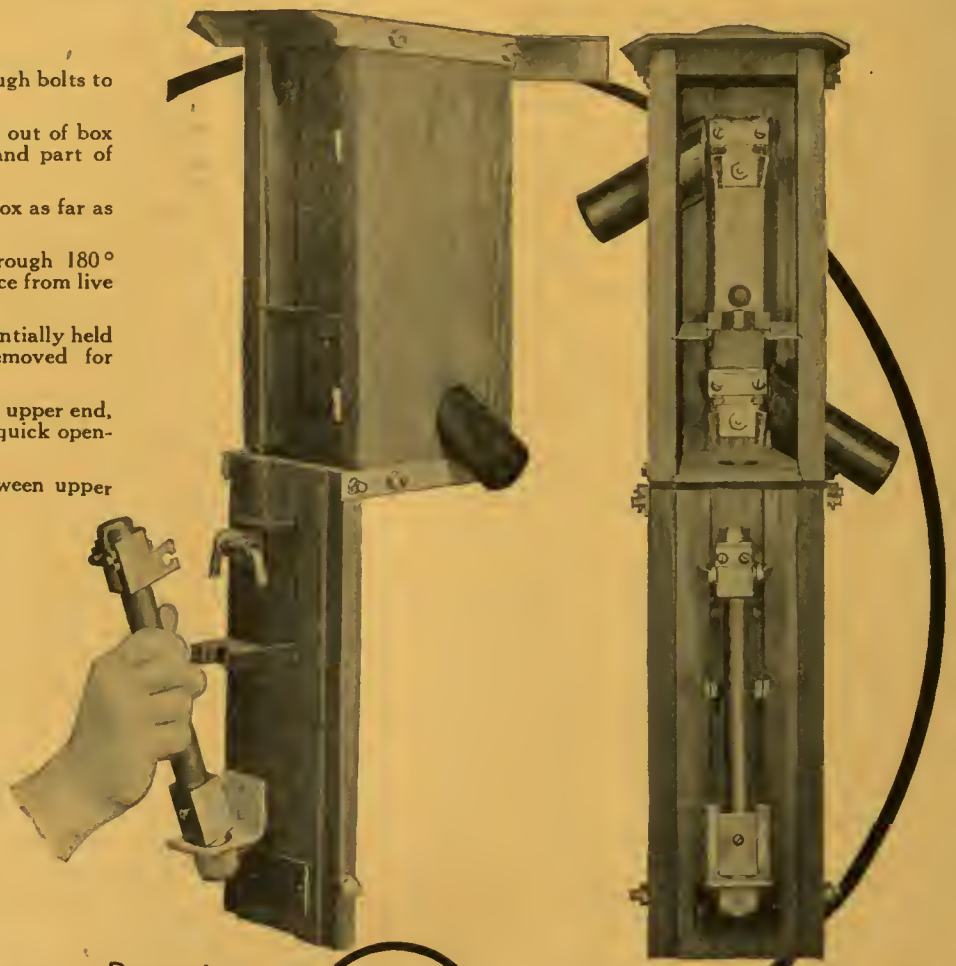
New ! Better! Safer !

The Type OD Safety-First Fuse Box for circuits up to 7500 volts.—Ideal for protecting outdoor distribution transformers.

Here are 10 Reasons Why:

1. Compact, substantial box with through bolts to prevent warping.
2. One-piece metal top keeps moisture out of box and forms the mounting bracket and part of simple latching device.
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5. Fuse tube of white bone fibre substantially held on mounting bloc, yet easily removed for re-fusing.
6. Fuse link, with decreased portion at upper end, assures blowing at that point, and quick opening of the circuit.
7. Barrier in box prevents arcing between upper and lower contacts.
8. One-piece base and outlet bushing of moulded insulation material prevent the charring of base.
9. Projection of the fuse into the outlet bushing causes hot gases to expand into the outer atmosphere instead of into the box.
10. Very high interrupting capacity is obtained because of features (7) and (9).

During periods when power is not used such as in grain elevators during winter months, the fuse tube may be removed and the fuse box closed, thus disconnecting the transformer from the line and preventing no-load losses.



Removing Fuse Tube

Door Dropped

Catalogue Supplement I-B goes into details, ask for it.

Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pa.

WESTINGHOUSE ELECTRIC

Westinghouse

Vol. 61, No. 9 New York, March 3, 1923 *Pages 357-394*

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What the Subscribers Read

IN THE routine circulation work, subscribers of the JOURNAL have been asked what articles or classes of articles they found interesting. The replies to this have been many and various. Here are a few:

M. Coué Ought to Read It

Everything — although personally I find the equipment details and the construction and operating columns most interesting, being an engineer. The JOURNAL *is* getting better and better all the time; M. Coué ought to read it regularly as it is a paper after his own heart! The articles are admirably written, in every detail, and always clear and crisp.—*A. H. B., Engineer.*

Appreciates Practical Service

"What and Where to Buy." This page is of great help in ordering odds and ends which are not standard goods.

"Alphabetical Index to Advertisements." This page is of great help in ordering also, because you have the address of the company before you and little time is wasted on where to send your order.

Your articles on one-man cars have been very good and they have taken and given the points desired, that is, good and bad, and in that way a person could apply the conditions to his own existing conditions. I believe your articles on maintenance of equipment have saved us a great deal and hope that we may see more of them.

—*N. E. N., Manager.*

The Back End of the Paper Appeals

"Manufactures and the Markets."
"Personal Items."
"Searchlight Section."

The above especially, the JOURNAL itself in general.—*J. T. McC., Purchasing Agent.*

Relative Interest Specified

In the order in which they are given, the items which interest the writer most in the ELECTRIC RAILWAY JOURNAL are:

1. Those articles dealing with the technical or practical details covering operation of railways.
2. Editorials.
3. Advertisements.

—*F. R. P., Superintendent of Equipment.*

Expert Catenary Construction Service

Some Westinghouse Installations











Long and extensive experience in the design, development and installation of catenary line material on interurban electric railway systems and on many important steam roads, qualifies the Westinghouse Company to give expert catenary construction service.

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East Pittsburgh, Pa.
Sales Offices In All Principal American Cities.

Westinghouse



NO. 532-B, 50 HP

To Improve Your Service

Here are some of the railway systems that are using the Standard Westinghouse No. 532 Railway Motor with success:

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Massachusetts North Eastern St. Ry. Co.
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United Ry. & Electric Co.
Schuylkill Railway Co.
Steubenville & E. Liverpool R. & L. Co.
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Cars now equipped with obsolete types of 50 h.p. motors can be brought to the greatest degree of operating efficiency by replacing the obsolete motors with Standard Westinghouse, Box-Type No. 532-B, 50 H.P. Motors.

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The saving is not achieved by any sacrifice of service. In fact, the public has come to regard "Safety Car service" as distinctive of the best that can be offered.

You can enjoy the advantages of the Safety Car either by adopting new cars of the standard type or converting existing "two-man" cars, and in either case you will find complete satisfaction in the use of our Air Brake and Safety Car Control Equipment.



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OF ST. LOUIS, MO.

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A week's copy for the papers *or* Not even a glance from a rider

It's easy enough for a car—bouncing across a rough steam road crossing—to throw the trolley wheel. And it doesn't take as long for a train traveling—say thirty miles an hour—to cover a thousand feet as for a conductor to race to the rear end, fumble with the rope and replace wheel on wire. And if train and car do connect—

Can't you see the big black headlines?
And the columns of sob stuff?
And the letters from "Indignant Citizens"?
It's good first page stuff for a week at least.

But suppose the wheel jumps the wire on a crossing protected with National Trolley Guard.

The wheel runs on the Guard—which is live—and the car travels on across the tracks and out of danger.

Probably not a single passenger even looks up from his paper. It is not even an incident. Yet National Trolley Guard has paid for itself a hundred times over.



Side View Single Trolley (also made for Double Trolley)



and, at the left an end-on view of National Guard. At the right is a crossing properly protected by National Trolley Guard.



The Ohio Brass Co.
Mansfield, Ohio, U.S.A.

New York Philadelphia Pittsburgh Charleston, W.Va. Chicago Los Angeles San Francisco Paris, France

Products: Trolley Material, Rail Bonds, Electric Railway Car Equipment, High Tension Porcelain Insulators, Third Rail Insulators

CAREFUL SURVEILLANCE from Tree to Treating Yard

SUCCESSFUL tie preservation demands a sound tie to start with. A decayed or unsound tie cannot give satisfactory service no matter how well it is treated.

The extreme care and personal supervision of ties immediately after they are cut is in large measure responsible for the soundness and longevity of International Ties.

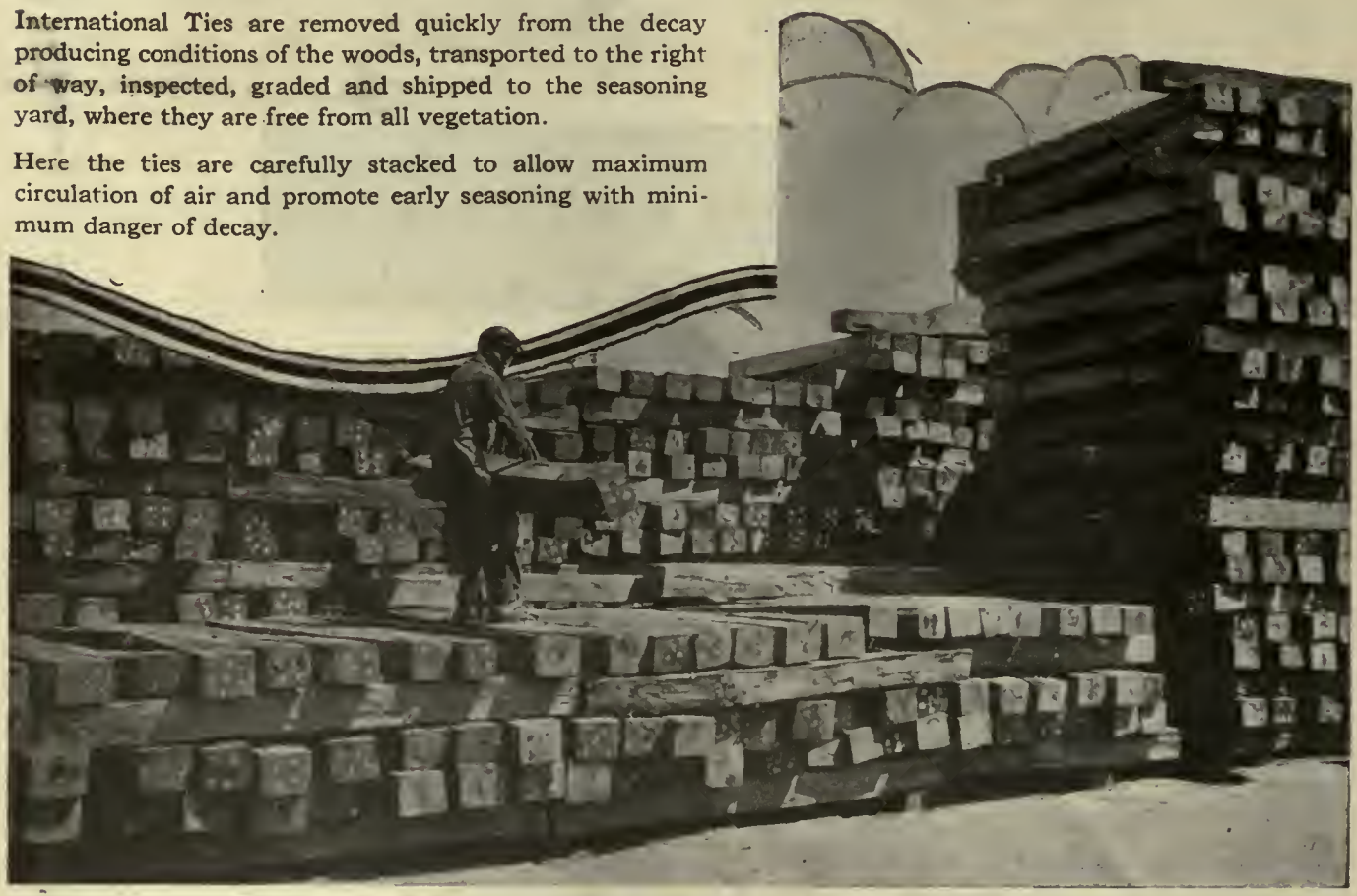
To secure sound ties, they must be properly cut and properly followed from the tree to the treating yard. The important fact to be remembered is that they must be ***Removed Quickly From the Woods.***

This period in the production of International Ties is given particular attention for its execution has a direct bearing on the ultimate life of the tie.

International Ties are removed quickly from the decay producing conditions of the woods, transported to the right of way, inspected, graded and shipped to the seasoning yard, where they are free from all vegetation.

Here the ties are carefully stacked to allow maximum circulation of air and promote early seasoning with minimum danger of decay.

International Ties are permanently marked with the I. C. C. Co. Dating Nail.



International Creosoting and Construction Co.

General Office—Galveston, Tex.

Plants: Texarkana, Texas Beaumont, Texas Galveston, Texas



High Class Construction
Need Not Be Expensive
Less Material Excavation and Labor with Steel Twin Ties

Steel Twin Tie Construction has lowered the first and final cost of paved track.

The utilization of the concrete formerly wasted between and below wooden ties has in every case effected a large saving in construction materials. And this saving is at no sacrifice in quality because more effective bearing is provided, both on the concrete, and the subgrade than with wooden ties while the steel cross members serve to reinforce the foundation concrete.

Write for the folder *"Costs, Methods and Best Practice in Steel Tie Construction"* and delivered prices at your material yard.

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Cleveland

SEMAPHORE



LIGHT



FOR DOUBLE TRACK
Interurban Railways

Union automatic ▫ block signals ▫

afford a simple system of indications easily understood by trainmen.

The continuous A. C. track circuit makes possible the use of "polarized" or "wireless" control and insures the display of the proper indication at all times.



On the W. B. & A. Railroad

UNION EQUIPMENT WILL SOLVE YOUR INTERURBAN TRAFFIC PROBLEMS

Let us study your operating conditions and cooperate with you in considering what *automatic block signaling* will do for *your line.*

Trade Mark **Union Switch & Signal Co.** Trade Mark

SWISSVALE, PA.

Absolutely, Mr. Colby!

"The value of a car as a revenue getter is in direct ratio with the effectiveness of its markings"—A. C. Colby, Supt. of Equipment, Dept. of Street Railways, City of Detroit, in Electric Traction, Dec., 1922.

Mr. Colby is right, absolutely! And his opinion is concurred in by hundreds of Superintendents in this country and abroad who are using Keystone Hunter Illuminated Signs to keep the destination points of their cars conspicuously displayed, and the length and breath of their territory constantly advertised to residents and transients.



Keystone Hunter Signs and Route Symbols do more than make your cars talk; they made it an easy matter for the superintendent to re-route his cars at will. This flexibility of control is not readily obtainable when cars are route-labelled in the paint shop or tagged with clattering metal and wooden signs that sometimes are and sometimes are not at hand. All your destination points are on the Keystone Hunter roller curtain.

Write for the data sheets.

KEYSTONE-HUNTER
ILLUMINATED DESTINATION
SIGNS

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Manufacturer of Railway Material and Electrical Supplies

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ELRECO



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Lightest Weight
Greatest Adaptability

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POLES

Only 5 men



—where 9 were used before!

Multiple Unit Door Control

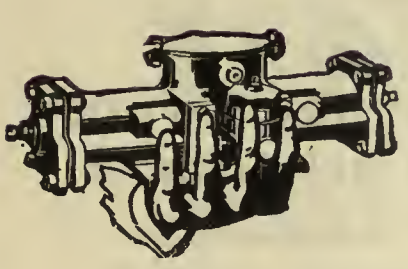
makes train operation still more economical

QUITE a progressive step, it was, when they first began coupling cars in trains of two or more units, and thereby eliminated one man per car.

But Multiple Unit Door Control beats that! It concentrates door control at any point or points you wish, and eliminates even the necessity for one man on every car.

Take the New York Interborough Subway trains as a conspicuous example. By means of National Pneumatic Multiple Unit Door Control, they now have five platform men per 10-car train, instead of 9, without impairment of service, or conflict of any kind. Passengers caught in closing doors are never hurt, because at the slightest touch the motion is instantly and automatically reversed, and the door repeats the cycle automatically until it is entirely closed.

It's the biggest money saver in train operation you can find.



Let us show you more!

National Pneumatic Company, Inc.

Designers, Builders and Installers

Door and Step Control — Door and Step Operating Mechanisms
Motorman's Signal Lights — Safety Interlocking Door Control
Multiple Unit Door Control

50 Church Street, New York — **McCormick Bldg., Chicago**
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Works: Rahway, N. J.

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Do More

Welding and Grinding

It Adds to Life of Track and Cars

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ATLAS Rail Grinder



RECIPROCATING Track Grinder

AJAX
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Highest capacity, lightest weight resistance type arc welder. At 600 volts its output is 333 amperes, at 300 volts it gives 200 amperes. Weighs but 155 lbs.

ATLAS
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An efficient, light-weight rail grinder at an attractively moderate price. Especially adapted for grinding off surplus metal after welding.

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A class by itself for removing corrugations and irregularities from rail-head. Should be used at the first sign of corrugation.

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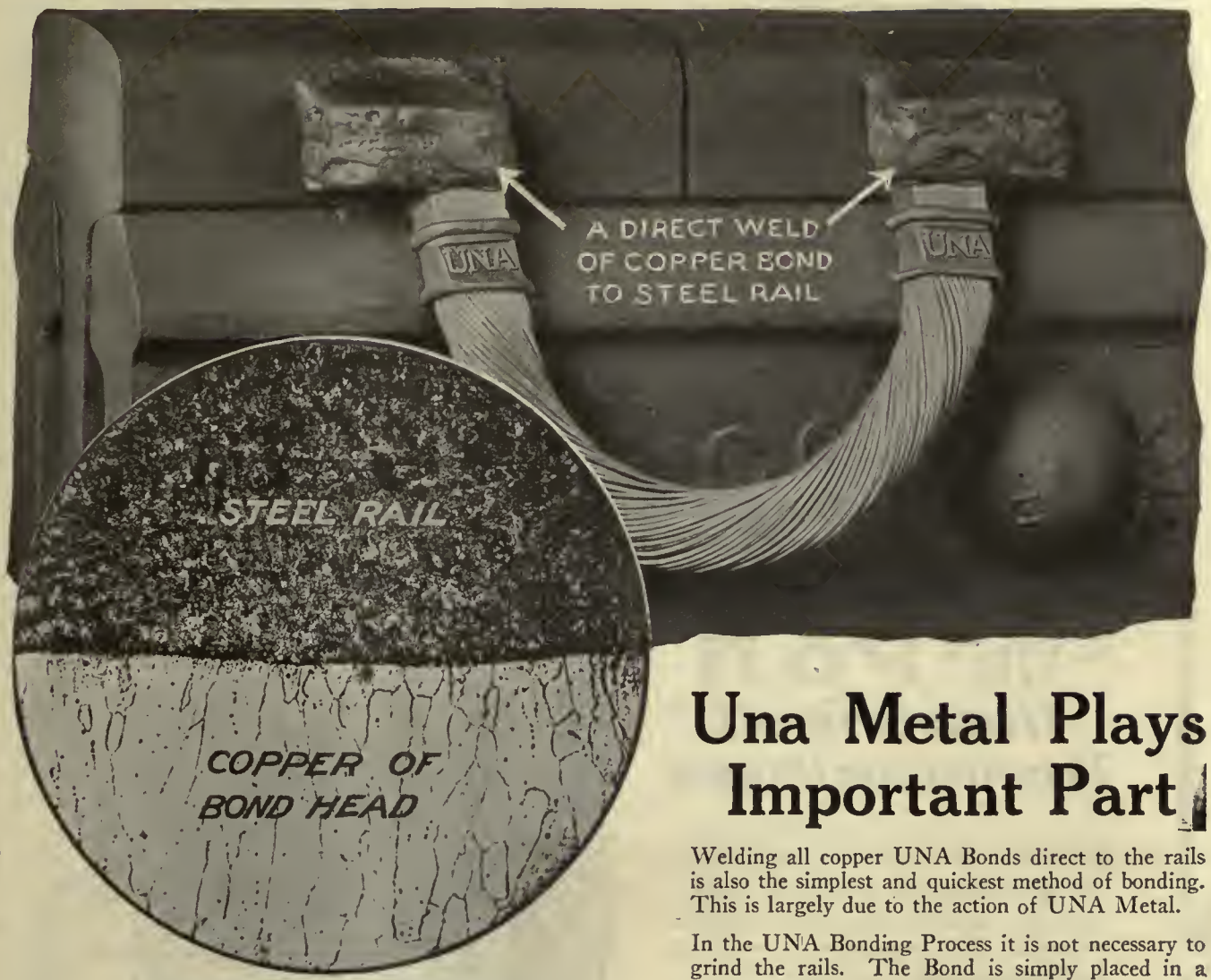


Photo-micrograph showing solid structure of copper bond head and complete union to steel rail

UNA Rail Bonds

Una Metal Plays Important Part

Welding all copper UNA Bonds direct to the rails is also the simplest and quickest method of bonding. This is largely due to the action of UNA Metal.

In the UNA Bonding Process it is not necessary to grind the rails. The Bond is simply placed in a mold against the rail. Then the Bond strands are melted together in the mold and UNA Metal added. When the mold is full the bond is finished.

In this welding of copper to steel, UNA Metal plays an important part. As the mold is gradually filled the molten UNA Metal cleans the rail of scale and oxides, giving clean steel to which the copper welds. It also eliminates the gases formed, produces a fusable slag which floats off and thus makes the copper in the finished bond head solid and tough.

Actual tests show it requires 25,000 to 32,000 pounds steady force to shear a bond head from the rail—and then the shear takes place through the bond head leaving the weld of copper to steel intact. These characteristics assure long life to UNA Bonds.

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Investigate UNA Bonds now—they save money.

Rail Welding & Bonding Company

Cleveland, Ohio

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—first to brand Butt-Treated poles for the protection of the buyer.

—first to use a butt-treating process that insures a deeper penetration of the preservative throughout the ground-line area.

—first to give a written guarantee specifying a definite depth of penetration.

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Prompt Shipment - yards conveniently located throughout the North Central and Western States.

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Write for illustrated booklet.

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"Well Jimmy, you have had about a year to watch these Helical Gears, what have you got to say about them?"

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"All right, Jimmy, I have decided to make them our standards."

"Don't forget boss, the Union Standard Trolleys as well."

MEMBER AMERICAN ELECTRIC RAILWAY ASSOCIATION AERA 1923

R.D. NUTTALL COMPANY
PITTSBURGH PENNSYLVANIA

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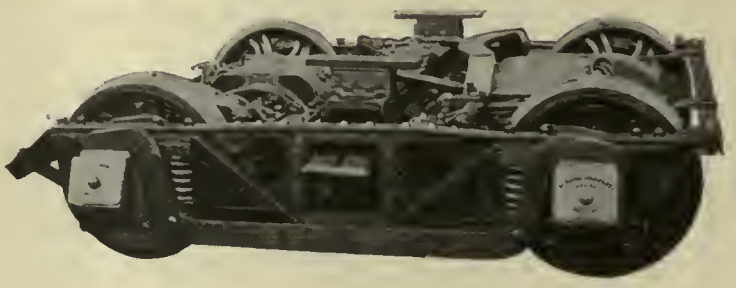
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EVERY GEAR REGISTERED

Nuttall



Multiple-unit-control double truck passenger car for two-man operation.



CITY and interurban cars and trucks, safety cars, combination and work cars, snow plows, sweepers, and electric locomotives.

Twenty years of specialization in the construction of all classes of rolling stock for the successful operation of electric railways.

McGuire - Cummings No. 62 Motor Truck for low car body for city service.

Inside hung brake-equalizer design, 26-in. wheels.

McGuire-Cummings Manufacturing Co.,

General Offices

111 W. Monroe St., Chicago, Ill.



Lubrication is of Extreme Importance

EXECUTIVE officers of electric railways are awakening to the fact that lubrication is not only a determining factor in securing efficient service from power house and rolling equipment, but that many other important expense items are regulated largely by its quality.

The installation of efficient lubrication on your road is not the simple proposition of buying oil, nor does the purchase of cheap oil indicate economy in lubrication —in fact, quite the reverse.

Service is the one unfailing test of oil quality. Unless the lubricant is capable of demonstrating efficient service, it is dear at any price. And SERVICE is not a difficult quantity to measure—it shows in performance.

The subject is one worthy of careful consideration. The mechanical and operating departments — as well as the purchasing—are interested, and in a position to judge service values at first hand. Their opinion is indispensable to intelligent selection.

Lubrication costs will be found high or low, exactly in proportion to the service results obtained. With the inevitable poor service that marks the use of cheap oils, the small savings made through their lower first cost is lost many times over in the expenses of repairs and depreciation caused by their shortcomings.

When the lubrication question is considered from all angles — when efficient service and ultimate economy are the deciding factors — Galena Oils will be found the only logical choice. They are now used by over five hundred electric properties.

"When Galena Service Goes In Lubrication Troubles Go out!"

QUALITY · SERVICE · ECONOMY — GSO — GALENA OILS

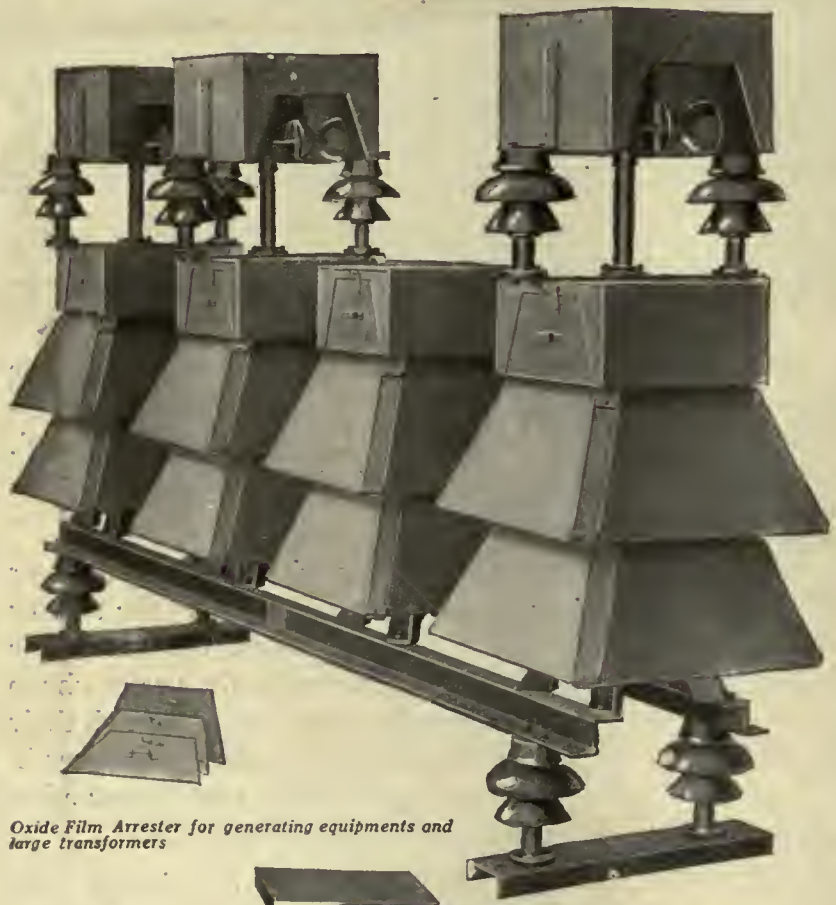
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New York Franklin, Pa. Chicago

and offices in principal cities

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Lightning may do a Year's Damage



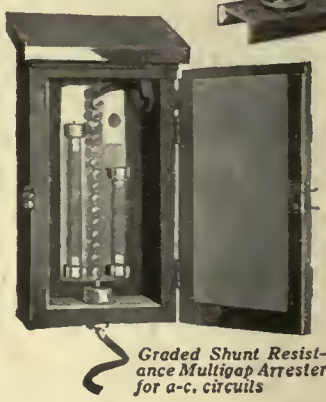
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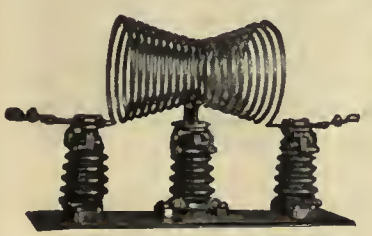
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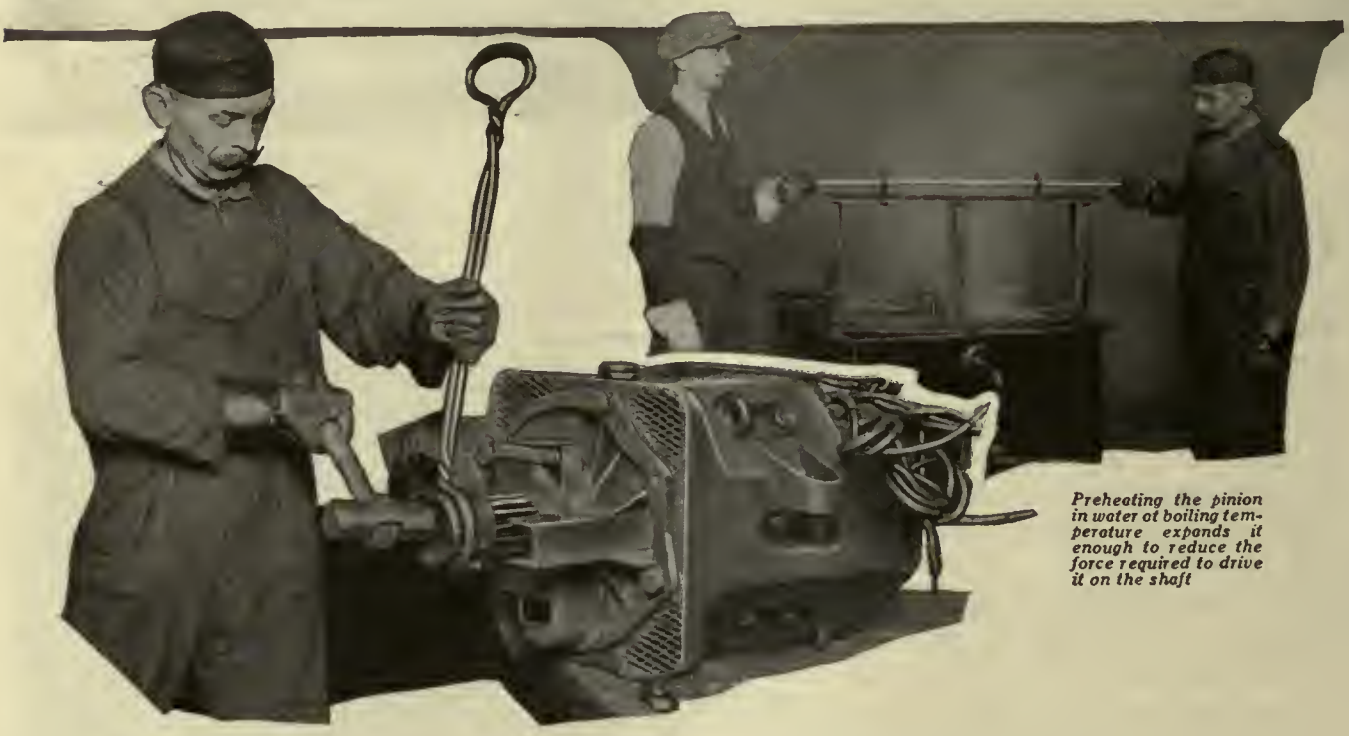


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ELECTRIC RAILWAY JOURNAL

Consolidation of Street Railway Journal and Electric Railway Review

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Trying to Keep Detroit Sold on Municipal Ownership

THE first report of Walter Jackson on the municipal system in Detroit has been made public and is abstracted elsewhere in this issue. Called in as a consultant to investigate and state for the benefit of the public with what degree of good management the municipal railway has been conducted thus far, and perhaps make recommendations for improvement, this first section seems to be little more than a means of giving publicity to the opinions and work of the municipal railway engineers. Mr. Jackson's function in this particular report seems to be more that of a publicity expert than a true consultant, for there is little of his own opinion expressed except for corroboration of the statements of the system's own engineers. Granting that the track engineering is good, to which fact the ELECTRIC RAILWAY JOURNAL gave credit at the time (issue of July 23, 1921, page 121), good engineering does not alone make municipal ownership a success. The critical time will come when politics begin to creep into the direction of the property.

But withal, credit must be given to the city administration in Detroit for realizing that there is an element of public relations in the public utility business even though municipally owned, and that in particular right now there is need to keep the people of Detroit "sold" on their decision to have municipal ownership. If Mr. Jackson's future installments show actual facts on the financial results and the real costs of car rides, including what may be derived from taxes, such figures and facts will be of much more interest to the Detroit public.

Continuous Progress Is Being Made in Electric Railway Accounting

DURING the past ten years the science of electric railway transportation has been revolutionized by the development of the one-man car. In electric railway engineering there have been almost, if not quite, as great developments through the use of higher potentials in transmission, the introduction of automatic substations, the adoption of effective motor ventilation and other improvements. Not all electric railway men realize, however, that side by side with these changes in other departments there have been equal advances in the science of electric railway accounting. To understand it one has only to recount the many new problems which have been thrust on this fundamental branch of the industry during the past decade. He will then appreciate how great a change has been wrought by our associates, the accountants.

Ten years ago, for instance, little was known of such subjects in electric railway operating as accounting for depreciation on a scientific basis, of cost accounting and of budget making. A knowledge of each of these now may be considered as almost essential in economical operation. The proper methods to be followed in valuation were also still unsolved. Many problems connected with the income tax, now satisfactorily settled, were then unknown. These matters have been largely lost sight of in what is perhaps the more spectacular development of other branches of the industry. They are brought out, however, in an interesting article on another page of this issue, contributed by M. W. Glover of Pittsburgh. Mr. Glover calls attention in the course of the article to the need of active co-operation in the Accountant's Association by every electric railway accountant. This plea could well be enlarged to include those in every department of an electric railway because, after all, every department must be closely allied with the accounting department if most efficient operation is to be expected.

Rail Joint Test Enthusiasts Are Making Progress

THE approaching tests on welded rail joints are rapidly taking on tangible form. Attendants at the meeting of the committee on this subject, held in Washington two weeks ago, witnessed the sample tests and were pleased with the way the work was done. Obviously if sample tests can be performed satisfactorily, the carrying out of a comprehensive program is simply a question of organization. The facilities of the laboratories of the Bureau of Standards, the University of Illinois and Purdue University will be drawn upon for the routine tests. The reputations of these institutions are a guarantee that the work will be well done.

The testing program divides itself into two parts. Of these the first comprises the application to rail joints of familiar and fairly well standardized tests. There is nothing novel or experimental in subjecting a rail joint to a bending, tensile, impact or electrical conductivity test. Such tests are made in scores of laboratories, yielding results of a high degree of accuracy. In fact, the safety of modern engineering work is predicated upon researches made with the highly developed testing machines of Olsen, Emery, Riehlé and others.

Data for rail joints obtained with standard testing machines will be valuable for comparison of different types of joints and different ways of making up each. They do not, however, exactly duplicate the conditions under which rail joints are used. Hence, the second part of the committee's program will comprise service tests, or approximations to these as close as can be devised.

The service tests will prove in many ways the most interesting because they will involve many novel features. They will require a lot of development work.

The repeated impact tests will bring out the effects of vibration in the joints, and the results obtained with the rotary service test machine will serve as a general check upon all of the other tests. In fact, the greatest value of the long-continued service tests will be to determine the factors of safety and the limitations which must be observed with the quicker and simpler tests. Presumably when a reasonable number of the more elaborate tests have been made, it will be possible to make a fair estimate of what a joint will do, without waiting in future for the tedious routine necessarily involved in the service tests.

Two Decades of Engineering Achievement

THE American Electric Railway Engineering Association is to be congratulated upon having reached the mature age of twenty years, for it was organized in Cleveland on Feb. 16, 1903. The mere reaching of such an age is not necessarily a cause for congratulation, but in this case the making of a notable record has gone along with the accumulation of years. The original name of the association was the American Railway Mechanical & Electrical Association, and among its first officers were two Detroit United Railway men, Thomas Farmer, president, and S. Walter Mower, secretary.

The Cleveland organization meeting, of course, did not just happen. It was the outcome of a lot of discussion among electric railway engineers as to how they could best organize for helpfulness to each other and to the industry as a whole. At the Detroit convention of the American Street Railway Association in the fall of 1902 the plan really got a start and the organization meeting was planned. Among those who were interested in getting the enterprise launched, in addition to the officers already mentioned, were H. H. Adams, Baltimore, Md.; R. E. Danforth and Alfred Green, Rochester, N.Y.; W. Roberts, Akron, Ohio; C. F. Baker, Boston, Mass.; D. F. Carver, Cleveland, Ohio, and perhaps a dozen others.

The new association was just off the ways when the American Street Railway Association undertook actively to reorganize itself, under the direction of the late W. Caryl Ely, for more aggressive and effective work. A part of the reorganization plan was the bringing into affiliation with the parent association of several electric railway societies, including that of the engineers, which had sprung up in response to a demand for opportunity for specialized discussion. Consequently at Philadelphia, on Sept. 25, 1905, the A.R.M.&E. Association affiliated with what had become the American Street & Interurban Railway Association, and took on the complicated name of the American Street & Interurban Railway Engineering Association. After laboring under this hardship for five years the association, at Atlantic City in 1910, changed its name to the present one, coincident with the simplification of name of the parent body.

At first the association had to find itself; to tackle a job that would bring out its best efforts. During the fifteen years preceding its organization the cities of the country had been largely provided with electric transportation. There was thus a vast store of experience to draw upon. The task to which the association addressed itself was the codification of this experience. It was necessary, however, to begin with generalities, practical ones to be sure, but the work gradually took on a more specific character. Through a process of evolution it has become highly organized under the elaborate committee system of today.

From the early days the importance of developing uniform specifications and other standards was recognized as the primary task of the association. A steady effort has been, and continues to be, made in this direction with great success, although the use of the association standards is still not as widespread as might be wished.

In its first few years of activity the association was obliged to work out its problems by itself, these problems being, or seeming to be, of a peculiar nature. As time went on, however, the wisdom and economy of close affiliation with other organizations has been seen. Today the Engineering Association is doing some of its best work in co-operation with other associations which are especially well qualified to furnish the technical data needed, and which in turn are glad to avail themselves of the experience of the electric railway engineers.

During its two decades of life the Engineering Association has seen the electric railway industry go through its period of greatest expansion. In this it has taken an important part. Now the country is fairly liberally supplied with electric railway facilities, and the live engineering questions relate to intensive development of traffic with the aid of new equipment better designed to yield the maximum of good service. Never has there been a more excellent chance than now for the Engineering Association to show what it can do in a practical way. There is thus reason to believe that the third decade of association history will be as fruitful as its predecessors in contributing to technical advances in transportation.

Street Congestion Aiding Solution of Newark's Traffic Problem

A SIGNIFICANT change of public sentiment is shown in the letters received by a leading newspaper in Newark, N. J., in reply to its appeal for suggestions to solve the city's traffic problem. Ever since the birth of the jitney business several years ago, the great majority of bus routes in Newark have paralleled the trolley tracks on the same streets. The fact that this was an unwise and uneconomical duplication of service did not seem to influence public opinion, which resisted vigorously every attempt to place the buses on separate streets. Recently, however, the congestion has grown so great in the center of the city where several lines of trolleys and numerous bus routes use the same streets, that the people have begun to realize the necessity for some change. The strong sentiment in favor of the removal of the jitneys to streets where no trolleys are operated probably does not indicate any sudden preference for the street railway as a means of transportation, but it does show that public opinion in Newark is tending toward a broader view of the city's traffic problem, and will support a reasonable and impartial solution. In other words, where it may sometimes seem that it is practically impossible to bring the public to see in advance that some measure advocated by the local railway is for the public's own best interest, the developments as time elapses are likely to be such that they force the people to "discover" this for themselves.



Heights



St. Clair



Collinwood

Three Automatic Substation Buildings in Cleveland

Automatic Substation Experience in Cleveland—I

In This First Section Are Given the General Considerations Leading Up to the Trial of Automatic Control in City Service, the Main Design Features of the Buildings and a Brief Discussion of the Equipment that Is Employed

By L. D. Bale
Superintendent of Substations, the Cleveland Railway

THE automatically controlled substation, as developed upon the property of the Cleveland Railway, has been carried to a successful result. Based on the experience had, the company has definitely decided to adopt this type of station for all future power requirements wherever applicable. In fact, the immediate program of the power department contemplates several additional automatic substations, among which are both one and two unit plants.

When it is recalled that the existing three automatic substations on the Cleveland property represent the first instance where full automatic control has been attempted on a large city system; also that they have the distinction of being the first two-unit plants of relatively large capacity to be constructed, it is something to say that the results obtained from these pioneer installations have been, indeed, gratifying. It may also be appreciated that the development of these installations presented many new problems, and that, on the whole, it was an intensely interesting study.

At the time the control for these stations was designed utilization was naturally made of such equipment as had proved reliable and was in service in many automatic plants then in operation. This also applied to the method or scheme of connections. It was necessary, however, in several instances, to develop new equipment, and to devise new methods of connections to meet the special requirements brought about by the type of system these stations were to serve and by peculiarities of control met with in this type of station.

Among the most important instances where special development was necessary were: (1) An arrangement guaranteeing a greater degree of insurance against service interruptions, which resulted in the necessity of development along the lines of refinement of control. (2) A system of protection of air-blast transformers against air failure which at the same time would make equipment so involved by air failures available for peak-load operation. (3) The development of higher capacity contactors, etc., required by the existence of larger current values than have hitherto been experienced in automatic converter substations. (4) The presence of two converters in one plant brought about some new development work. However, this phase of control was accomplished, in the main, by making additions to existing relays and by adding interlocks.

As is invariably the rule when a venture is made into new fields with time-tried equipment, a number of the standard devices failed under conditions of service required of them, thus making still further development necessary. The sequence of operation of the control has been changed, in some cases numerous times. In fact, in certain instances, portions of the scheme have been actually reversed until finally a point was arrived at where a sequence of operation has been evolved that, in the estimation of those familiar with the development, may be depended upon to function with perfect satisfaction under any emergency that may arise in the operation of a substation upon an urban system, where uninterrupted service is demanded.

Necessity for Additional Power Facilities

There existed, before the addition of the present automatic substations, three territories throughout which difficulty was being experienced in maintaining schedules by reason of inadequate power supply. This condition was primarily due to increase in traffic, and was further augmented by the new schedules which called for higher speed together with additional trains. In one instance an entirely new line was being constructed (the Cleveland Interurban Railway). These territories were outside of the 2-mile distribution limits of the then existing sources of power supply, and the potential drop during peaks was in most instances excessive.

To rectify this condition by increase in feeder copper from existing plants was impractical, not only from the

standpoint of the investment to be made in copper, plus the annual charges and losses thereby accruing, but also because this scheme involved an increase of conversion equipment in existing surrounding plants. The alternative to the additional copper plan was necessarily additional power facilities located within the territories affected.

The fact that these areas were widely separated eliminated the possibility of one plant supplying all involved territories. The nature of the problem, therefore, resolved itself into the utilization of small power producing centers, provided this could be accomplished economically. A study was accordingly made of this phase of the matter with the result that the adoption of the automatically controlled substation was decided upon.

be retired shortly by the utilization of additional converter substations. Whether this will be accomplished entirely by automatic plants, or whether a manual station will be utilized together with two or three automatic plants, will hinge upon the decision of a local matter having an important bearing on the subject of the economical power which is to be supplied to the territory that is involved.

Contracts were let for building and equipment, and the first automatic station, known as the Heights substation, was put in service in August, 1920. Before this station was ready for operation the demand for additional power became so acute, in this particular territory, that a temporary substation of 1,000 kw. capacity had to be constructed to supply increased

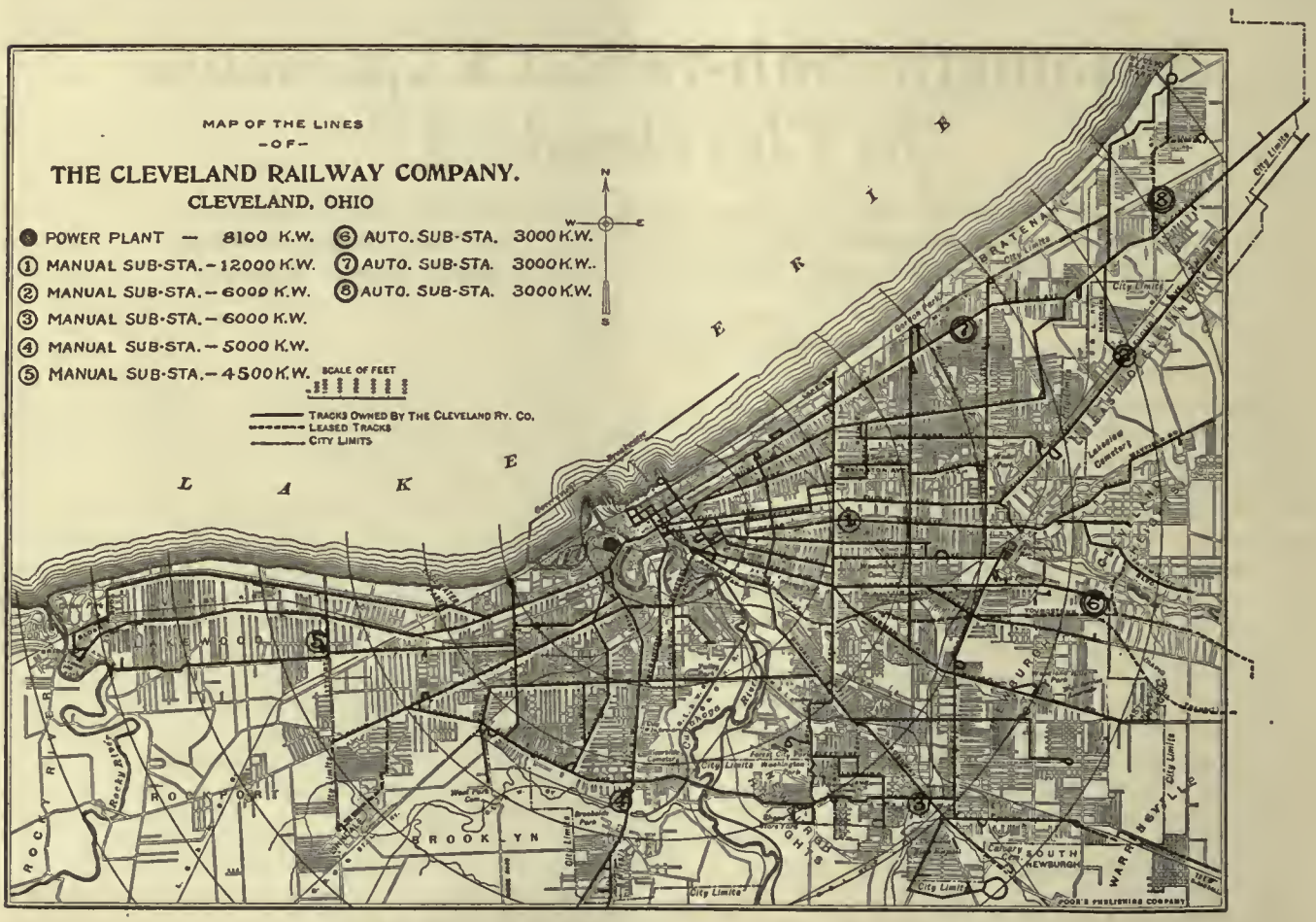


Fig. 1—Map of Cleveland Railway System Showing Locations of Substations

Further study of the subject brought out the fact that as far as the territories in question were involved the two-unit station proved to be the most desirable, taking all conditions into account. The most important of these were land values, building costs and restrictions, d.c. feeder system, reserve capacity (both in converter equipment and in alternating-current feeders) and, above all, a power source having the highest possible degree of reliability obtainable.

With the automatic plants in operation, the total substation installed capacity amounts to 42,500 kw., consisting of twenty-seven 1,500-kw. synchronous converters and two 1,000-kw. converters. In addition, there is one steam-driven 600-volt d.c. plant of 8,100 kw., bringing the total system capacity to 50,600 kw. By referring to Fig. 1, distribution of this equipment over the system will be noted. The steam-driven plant is to

potential to portions of the most important lines leading through the territory. This temporary substation was, of course, abandoned when the Heights automatic substation went into operation. The second station to be placed in service (April, 1921) was that known as the St. Clair substation, which was closely followed by the Collinwood substation in June, 1921.

Design of Buildings to House Automatics

In planning the buildings for these pioneer automatic installations, lack of precedent and insufficient time to make the necessary exhaustive study of the absolute requirements of a building to house equipment of this type in urban service caused the adoption of the standard manual type of building in all details wherever practical.

These plants are fireproof, the only combustible ma-

terial used in the construction being the insulating wood base upon which the switchboard slate and supports are mounted. Steel window frames fitted with wire mesh glass are used throughout. All doors are of hollow steel construction. The large door observed in the front elevation of the St. Clair and Collinwood substations provides not only an ordinary entrance door to the plant but one which can be utilized as a material door also. The door structure, measuring approximately 10 ft. square, is provided with side channels and is equipped with a 1-ton chain falls. When it becomes necessary to move bulky objects in or out, the entire door structure may be hoisted into the clear. The rail around the entrance platform is also readily removable, thus forming an unobstructed path for the moving of large heavy objects. In the case of the Heights substation sufficient room was available in the rear of the building to install the customary steel rolling door for material entrance. The exteriors of the buildings are sufficiently different in appearance to break the monotony of a set design and were planned to conform with surrounding buildings in each individual case.

By referring to Fig. 2, it will be noted that the buildings are arranged in conformity with the standard layout for manually operated stations on this system. Special features were introduced to care for ventilation of converters and current limiting resistances. Likewise, rearrangement of steel was made to accommodate the crane and to furnish a balcony upon which to place current limiting resistances used in d.c. feeder and converter circuits.

The subject of proper ventilation of substation buildings has, in general, seldom received special attention in the past. This phase is, however, of importance when considering automatic stations, and especially so when the station is in urban service. This is true not only because of the larger capacity involved in city work, but also because of possible interference with, or entire cutting off of, the supply of air for natural ventilation of the building by surrounding structures. There is also the limitation placed upon the customary "wall opening" method of ventilation in city work because of the necessity, in some cases, of confining equipment operating noises to the plant itself, or approximately so. The matter of ventilation of metropolitan automatic substations must receive serious thought, for with poor ventilation resulting in high temperature, not only will the rating, and in some cases the life, of the various

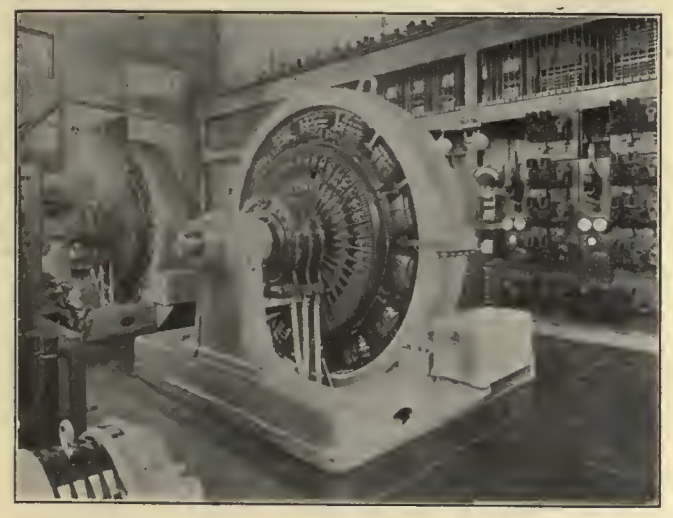


Standard Cleveland Railway Automatic Drainage Panels

pieces of equipment involved be affected, but the reliability of the station as a whole might also be endangered by the untimely operation of any one of the thermal devices constituting part of the equipment.

In the study of this problem in Cleveland, numerous ventilation charts were prepared for illustrating the course of air current throughout the plant. A glance at the charts (Figs. 3 and 4) will suffice to indicate that the laws of natural ventilation are rendered almost entirely inoperative. It will be noted that the circulation of air in the basement under the converters is from front to rear of the building, carrying out the warm air from the converters in its passage through. Any tendency for the cool air to rise and enter the converter is repelled by the blast of warm air thrown off by the converter armature. On the main operating floor it will be noted that the air currents resolve themselves into a series of eddies or whirlpools, and that unless they approach the roof ventilators within approximately 12 in. they are not affected by the natural draft of these devices. Four of these ventilators are located in the roof, each 30 in. in diameter.

No difficulty has been experienced in the present plants due to the relatively high room temperatures attained during unusually warm summer days, notwithstanding the presence of the air-blast transformers, except with thermal relay equipment that was funda-



1,500 Kw. Rotary Converter, with Total Load Meter and D.C. Converter Contactor Panels



A.C. Starting Panels, with Transformers and Oil Breaker Structures

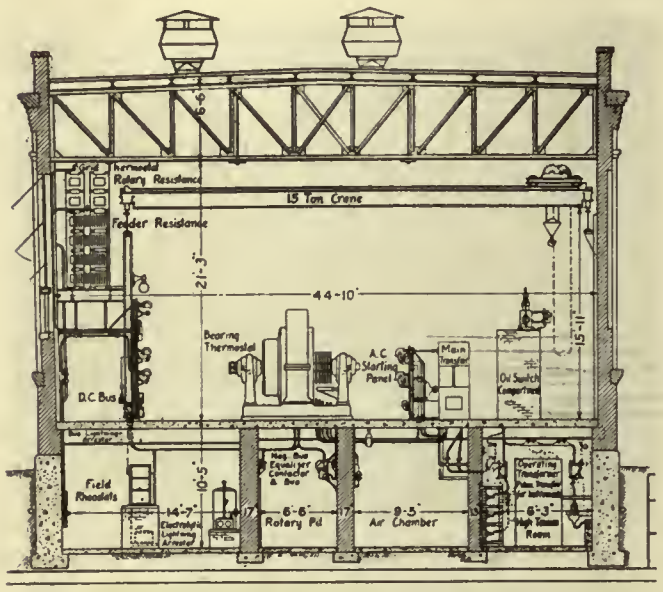


Fig. 2—Standard Automatic Substation Layout in Cleveland

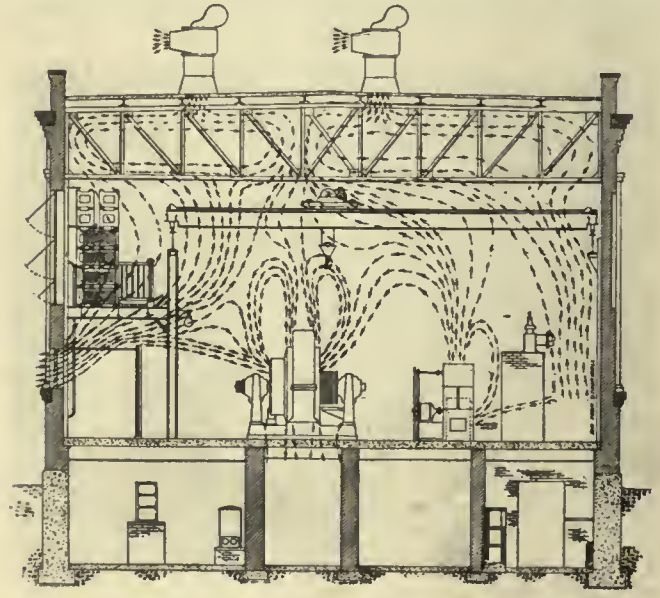
mentally wrong in its application, and has since been redeveloped. However, it is realized that, if the plants were located in close proximity to or possibly adjoining near-by buildings, trouble could be expected. Adequate ventilation of plants of this type can, without doubt, be accomplished by adopting forced draft. This, however, involves additional equipment, which is not desired. At the same time, it is realized that there will be some plants so located that forced draft will have to be resorted to in order that proper ventilation may be obtained.

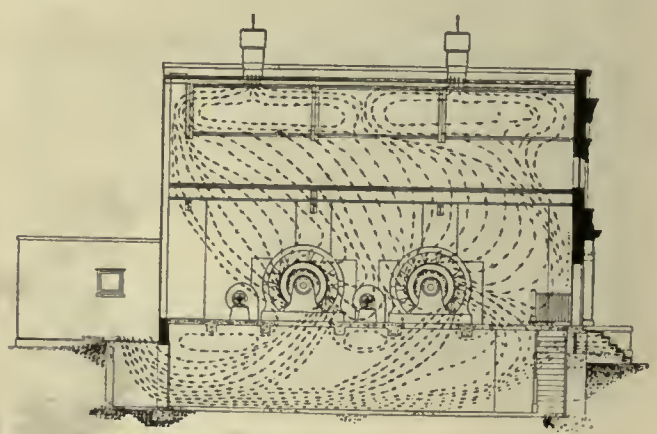
Equipment Installed in the Cleveland Automatic Stations

The three automatic substations are of 3,000 kw. capacity, made up of two 1,500-kw. synchronous converters each. The converters are of the type developed for and known as the Cleveland Railway standard. The first of these converters was placed in operation in Cleveland in 1912, at which time the four original manually operated plants were constructed. Nine 1,500-kw. converters and two 1,000-kw. converters were purchased at that time. Since then four additional 1,500-kw. converters have been added to the original four stations, and in 1917 the Cedar substation was built, containing eight converters of the same design, type and capacity. The standard converters which have been described upon previous occasions are of 1,500 kw. capacity, 60 cycles, 514 r.p.m., six-phase, fourteen-pole, 600 volts d.c., compound wound and equipped with interpoles. These converters, it will be recalled, were especially designed, utilizing interpoles, heavy armatures, etc., to insure satisfactory operation with fluctuating d.c. loads. During the ten years since the first converter was put into operation, these machines have given such perfect satisfaction regarding reliability and economical operating characteristics that, when the question of converter equipment for the new automatic stations was broached, the railway would not consider any converter other than that built upon the specifications of the standard. As a result, the converters being used in the automatic plants are identical with those on the remainder of the system, with the addition of flashboards on the commutator ends and such apparatus as was necessary for automatic operation.

Each of the two converters in these plants is complete with three single-phase, 11,000/410-volt, 60-cycle air-blast transformers connected in delta, and having 8.4 per cent impedance each. The secondaries of the transformers are provided with ½ voltage tap for a.c. converter starting. Each group of transformers is supplied with air by a 15,000-cu.ft. blower, induction-motor driven, receiving energy from the main transformers. These two blowers exhaust into a common air chamber. Each blower, having sufficient air capacity, can be relied upon to protect the entire group of transformers from overheating in the event of the failure of one of the blowers to operate. Under normal conditions each blower is operated only when its particular converter operates. To prevent discharge of air from the air chamber in a reverse direction, through a blower not in operation, each blower is equipped with a damper arranged to close automatically when the blower ceases to deliver air.

The alternating-current supply for these stations is obtained through two underground 11,000-volt, 60-cycle, grounded, neutral lines. Either of the feeders has sufficient capacity to supply both converters with energy. These feeders are normally tied in parallel through the a.c. bus at the substation end. By this arrangement either of the a.c. feeders may be disconnected from service, either through routine operation or by reason of trouble occurring upon them, without interfering with the continuity of service of the plant. Each a.c. feeder





Figs. 3 and 4—Ventilation Charts for Cleveland Substations

is protected at the generating end by inverse time-limit overload relays, while at the substation end instantaneous reverse power relays are installed, only. Each a.c. feeder is connected to the a.c. bus at the substation through a 600-amp., 25,000-volt, electrically operated oil switch, remote controlled from the a.c. line panel by the customary manual type of control switch. These oil switches are, therefore, not automatic in their action except by reason of the operation of the reverse power relays in the event of line failure.

The arrangement of the two principal control boards is indicated in Figs. 5 and 6. Referring to Fig. 5, showing the main board, it is noted that the first panels encountered at the right of the board are the two incoming a.c. line panels. These are complete with various recording and curve drawing instruments, together with the reverse power relays.

The next panel (3), is known as the sequence panel. This carries, in addition to the low-voltage relay (1), various switches through which control of the operating circuits of the converters is obtained. Also, means are had on this panel for reversing the operating sequence or schedule of operation of the converters; that is, causing one converter to be "lead-off" and the other "follow-up," or vice versa, this schedule being varied at given periods. The fourth panel contains relays used in connection with remote, supervisory control and indication. The fifth and sixth panels contain equipment for automatic control of the converters.

Panel 7 contains relays for the control of the shunting contactors for the d.c. converter current-limiting resistance of both converters. Through the use of these relays synchronized action of the corresponding d.c. converter shunting contactors of both converters is also secured, thus eliminating the possibility of pumping of contactors with the resulting interchange of load between converters during overload periods.

Panels 8 and 10 each carry the shunting contactors for the d.c. converter current-limiting resistance.

On panels 9 and 11, known as the converter meter panels, is mounted, in addition to the d.c. ammeter, d.c. wattmeter, reactance volt-ampere indicator and three relays, a carbon circuit breaker. This breaker is

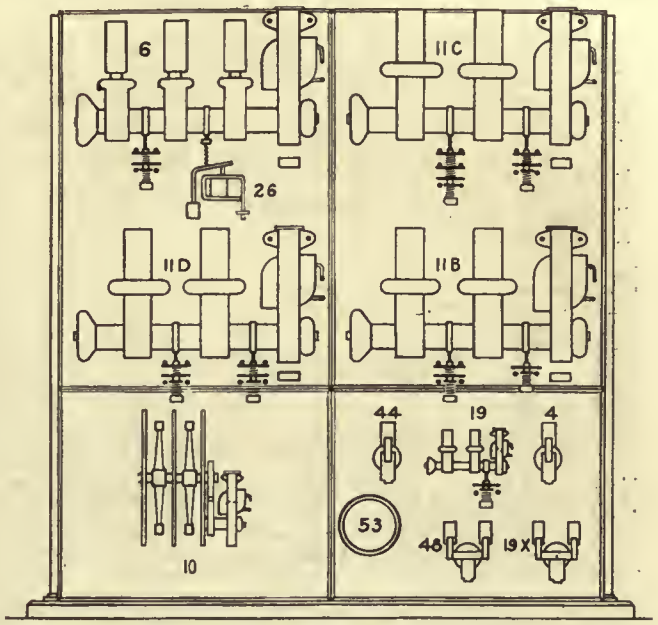


Fig. 6—Alternating-Current Starting Panels for Rotary Converter

equipped with a trip coil in connection with the speed-limiting device of the converter, and its one function is to disconnect the converter from the d.c. station bus in the event of overspeed, an interlock, in connection, shutting down and locking out the converter when the breaker operates. This breaker is hand reset and is also used as a safety measure during periods of inspection.

Panel 12 is a total load panel, and is equipped with a differential indicating voltmeter, a curve drawing graphic station voltmeter and a curve drawing graphic station ammeter. The last mentioned instrument will be dispensed with when the power indication system is in operation. Panel 13 is one of the nine standard outgoing d.c. feeder panels. The present method of control of these panels is not acceptable on the system, and will give way to a scheme of remote control, of which mention will be made later.

Mounted apart from the main board are the a.c. con-

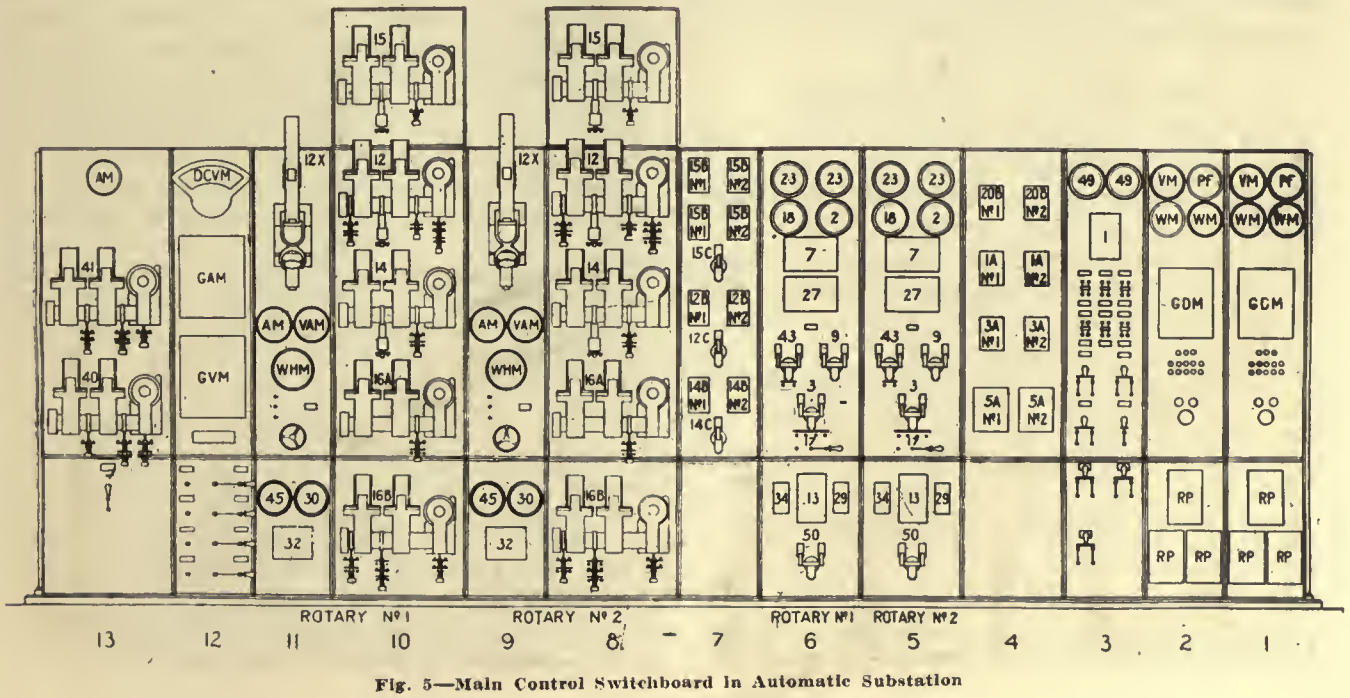


Fig. 5—Main Control Switchboard in Automatic Substation

TABULATION OF RELAYS, CONTACTORS, ETC.

1. Undervoltage d.c. relay for initial starting.
2. Low voltage delay a.c. relay, preventing unnecessary starting after closing of relay 1.
3. Master relay.
4. Starting contactor relay, controlling contactor 6.
6. A.C. converter starting contactor, ½ voltage tap.
7. D.C. polarized motor relay for converter potential correction.
9. Field contactor relay, controlling field reversing contactor 10.
10. Field reversing contactor.
11-a, b and c. A.C. running contactors.
12. D.C. converter contactor.
12-a. D.C. overload converter relay, controlling contactor 14.
12-b. D.C. overload converter master relay.
12-c. D.C. overload intermediate relay.
12-x. Shunt trip coil, operating carbon circuit breaker, also shunting out master relay 3.
13. A.C. converter underload relay.
14. D.C. converter resistance shunting contactor.
14-a. D.C. overload converter relay, controlling contactor 15.
14-b. D.C. overload master relay.
14-c. D.C. overload intermediate relay.
15. D.C. converter shunting contactor.
15-a. D.C. overload relay, controlling contactor 16-a.
15-b. D.C. overload master relay.
15-c. D.C. overload intermediate relay.
16-a and b. D.C. converter resistance shunting contactors.
17. S.p.d.t. knife switch for changing from automatic to non-automatic operation.
18. Reverse phase and low voltage a.c. relay.
19. A.C. relay, controlling contactors 11-a, b and c.
19-x. Relay, shunting starting contactor relay 4.
20. Oil breaker between a.c. bus and primary of transformers.
20-a. Latch coil for breaker.
20-c. Operating coil for breaker.
21. A.C. relay, controlling 22.
22. A.C. relay, controlling energy for breaker operating coil 20-c.
23. A.C. overload relays.
24. Overspeed device on converter.
25. Bearing thermostats.
26. Field reversal limiting relay.
27. Delay relay.
27-s. Contacts of No. 27 relay which close if converter does not complete cycle of operation in given time, or if there is a sudden overload making it necessary to bring on the second converter.
27-t. Contacts of No. 27 relay which close when load drops to predetermined low point and remains there for the time setting of the relay.
28. Thermal relay for converter grid resistance.
29. Replica thermal relay for shutting down converter in the event of sustained overload.
30. Lockout relay.
30-r. Reset coil for relay 30.
31. Brush operating mechanism.
32. D.C. reverse current relay.
33. Thermal relays for feeder grid resistance.
34. Replica thermal relay for starting second unit.
37-a and 38-a. Sequence switches.
39. D.C. equalizer contactor.
40. D.C. feeder resistance shunting contactor.
41. D.C. feeder contactor.
42. Air pressure relays for protecting air blast transformers against air failure.
43. Relay for starting second unit in the event of failure of first unit or overload.
44. Shunt field protection relay.
45. Phase balance relay.
48. Temporary lockout relay in connection with air pressure relays 42.
49 and 50. A.C. power failure protection relays.
53. Non-starting protection relay.

verter starting panels (Fig. 6), as is the case with the 110-volt control battery and motor generator charging set panels.

These stations are also equipped with standard Cleveland Railway negative drainage panels (illustrated in an accompanying photograph) for controlling the negative drainage of various subterranean structures. The operation of these panels is such that all contactors close upon the starting of the first converter in the house and open when the last machine ceases operation. Connection between the negative bus and the various underground metallic structures is completed upon the closing of these contactors. In the majority of cases current-limiting resistance is installed in the drainage circuit.

It will be noted, referring to Figs. 5 and 6, that the various items making up the automatic control are given numbers. If it is desired, reference can be made to the tabulation of relays, contactors, etc., thus identifying any of them.

The second section of this article, to be printed shortly, will give a comprehensive discussion of the scheme of operation, showing how each part of the control-equipment functions.

Warning the Automobilist

TEN safety suggestions have recently been sent in the form of a letter to some 20,000 automobile drivers in Albany and vicinity by the Union Traction Company of Albany. The suggestions follow:

1. Make sure trolley car is not coming when starting out from the curb, and give proper warning before starting if car should be near.
2. Do not trail trolley car too closely.
3. Cross crossings cautiously.
4. Be watchful of trolley car making curve so as not to be hit by the swing of rear end.
5. Avoid parking cars near trolley curves in narrow streets so as not to be caught "in the pinch."
6. Avoid speeding to get ahead of trolley when other cars are parked at the curb.
7. Avoid crossing in rear of trolley car. Other cars, unseen, may be coming in the opposite direction.
8. To get ahead of trolley car, make sure it is well to the rear before cutting in front.
9. Observe the law and do not pass trolley while it is taking on or discharging passengers.
10. When parking at curb in narrow streets, be sure there is plenty of room for trolley to pass.

Elevated Structure Abandoned

THE elevated structure of the Kansas City Railways, connecting Kansas City, Mo., and Kansas City, Kan., after thirty-six years of service has been abandoned due to the failure of one of the 60-ft. longitudinal supporting girders. This structure had been used as the roadbed for the street railway systems of both cities and was an important link in their rapid transit system. The member in question was of the conventional open girder type, built up of angles. The failure was no doubt due to the rusting through of the lower angles or tension members of the girder. The city engineers of both cities, together with the engineers of the operating company, made a careful inspection of the entire structure, after the initial sag was discovered, and reported it unsafe for travel. A new structure of reinforced concrete and steel is contemplated to replace the old structure.

New Plan for Providing A.E.S.C. Funds

A NEW grade of membership in the American Engineering Standards Committee has been approved by its executive committee through which it is expected that $50,000 extra annual income will be secured. The new members will be known as "sustaining members"; they will be asked to contribute one-thousandth of 1 per cent of their gross annual incomes or 1½ cents per $1,000 of aggregate value of corporate securities. A new information service will be created for the benefit of these members. Heretofore the committee has been financed entirely by dues from the nine technical societies and seventeen national trade associations, which, with seven government departments, constitute its present membership.

During the year 1922, according to the report of the state inspector of hulls and brakes at San Francisco, the number of passengers crossing San Francisco Bay on the Key Route ferries was 15,551,624. This is an increase over the 1921 figure, which was 14,996,988. This report shows 1922 to have been the busiest year since 1915, the year of the Panama Pacific International Exposition, when the Key Route tramway, boat and train system carried 16,677,421 passengers.

What Accountants' Association Has Done

A Past-President of the Accountants' Association Lists a Number of the Important Achievements of the Association, Points Out Some of the Problems Ahead and Urges All Accountants to Take an Active Interest in the Work

By M. W. Glover
General Auditor West Penn Railways

THE importance of accounting and its value to the electric railway industry is not fully realized or appreciated. Andrew Carnegie cannot be classed as a theorist, but was a successful, practical business man. He recognized the importance and value of accounting and made the statement: "There is not a science or class of men on whom the business of the world is more dependent than the science of accounts and accounting."

At the 1915 session of the Accountants' Association, P. V. Burington, Columbus, Ohio, presented a paper reviewing the activities of the Accountants' Association and called attention to some of the problems which at that time had been brought before the association for discussion. He called attention to some remarks by Paul R. Jones, then auditor of the Doherty organization, in connection with the importance of the accounting department.

> In recent years certain factors have raised the auditing department of the public utility organization from a purely clerical status to that of one of its most important departments.

In the call for the organization meeting held in Cleveland, March 23, 1897, the following appears: "Headquarters will be at the Hollenden Hotel, which has made a rate of $3 per day, American plan." At the present time this seems almost unbelievable.

From the time the Accountants' Association was organized in 1897 up to the present, the work of the association has been devoted to the objects for which it was formed. The following is taken from Article 2 of the constitution of the association adopted in 1897 and amended in 1910:

> The object of this association shall be to bring together those engaged in the accounting department of urban and interurban railway companies and the electrified sections of steam railway companies for the interchange of ideas, to promote the adoption of a uniform system of accounts, and to improve the work of the accounting department.

Apparently an impression exists in some quarters that the work of the Accountants' Association was over when it adopted a uniform system of accounts. This erroneous impression should be corrected, as it is not true that the association has completed its work. In fact, the adoption of a uniform classification of accounts is merely the first step in accomplishing the purposes for which the association was organized. In a recent article on the subject of "Lack of Uniformity in Electric Railway Accounting" attention was called to the fact that the adoption of a uniform system of accounts does not necessarily mean that all companies which have adopted this system are handling their accounts in a uniform manner, and the desirability of uniformity in accounting practices is emphasized.

It will be noted that the first object of the association is "to bring together those engaged in the accounting department of street railway companies for the interchange of ideas." This was undoubtedly placed first, with the thought that before any results could be obtained, those engaged in the accounting departments of electric railway companies must first be brought together, to interchange ideas and to discuss problems of mutual interest. The informal discussions, as well as the prepared papers presented at the various conventions of the Accountants' Association, cover a large number of accounting problems, and many of the papers presented represent the expenditure of valuable time and study. Every electric railway accountant should be glad of the opportunity afforded by the association to meet others, some of whom have been in the accounting departments of electric railways from the time the old horse car lines were electrified, and it is a matter of congratulation that accountants have always been pleased to discuss accounting problems with their brethren and to give them the benefit of their experience in handling many intricate and difficult problems, which arise from time to time.

From the organization of the Accountants' Association to the present time the published minutes are filled with valuable information and data which cannot fail to prove of assistance to any electric railway accountant, no matter how long he has been handling accounts or what system of accounts he may use. Some of the subjects which have been discussed at conventions of the Accountants' Association are of vital importance to all electric railway accountants, and if they do not take advantage of the opportunity afforded by attending conventions of the association and meeting others engaged in accounting work for electric railways they are losing an opportunity which would be eagerly sought by many engaged in other lines of business.

Testimony on Value of Association

The following remarks taken from the addresses of presidents of the association are interesting:

1898—H. L. Wilson: "Accounting is now looked upon as a much more important branch of the business than was the case a few years ago, and we must make it the aim of this association to make it still more important each year." In other words, day by day in every way we are getting better and better.

1900—C. N. Duffy: "The annual conventions give the members an opportunity of meeting each other, interchanging ideas, learning from each other and acquiring knowledge and experience which could not be obtained in any other way."

1901—W. F. Ham: "I cannot conceive how any one who has attended these conventions, participated in the meetings and mingled with the other members, could fail to be benefited by it, with the possible exception of the man who has a 'perfect system' and 'knows it all.'"

1902—H. C. Mackay: "Let me remind you that we each and all owe to the association and to the companies we represent prompt and faithful attendance at all meetings."

1903—H. J. Davies: "One of the most beneficial features of our annual meetings is the exchange of ideas in conversations among ourselves outside of the regular meetings."

1906—W. B. Brockway: "I believe, positively, that as

you work for the interests of this association, so will you benefit in knowledge and other ways."

1909—R. N. WALLIS: "I wish to call attention again to the fact that the main value to the individual in these convention sessions lies in the thorough discussion of the subjects presented."

1912—P. S. YOUNG: "The scope of the accountants' work in the business world is continually broadening, and nowhere is this more apparent than in the electric railway business."

1913—J. H. NEAL: "In all modern big business it is gradually becoming a maxim that a business is no better than its accounting department."

1920—I. A. MAY: "Cost accounting has been developed in the large manufacturing industries to a fine art, and my message to you is that our association develop cost accounting in our industry in advance of the requests that are bound to come to us for this kind of information."

COMMITTEE WORK THOROUGH

Most of the work of any association which meets in convention once a year must be done through its committees, and the Accountants' Association has been able to secure as members on its committees those who are willing to give sufficient time to committee work, in order that the reports might be of value to the association. Some of the committee reports and the discussions following their presentation have brought out many important features of accounting work, and members of the committees, who have done the most work, frankly admit that it has been of great benefit to them personally. Any accountant who honestly investigates the activities of the Accountants' Association and will take part in these activities will never regret it. He will feel that his time has been well spent, and the experience gained will be of material benefit to him personally as well as to the company which he represents.

The Accountants' Association intends to continue active work along the lines for which it was organized, and those accountants who have not taken an active interest in the association in the past will find that they have been the losers and those who have given time and work to the association will profit.

TOPICS DISCUSSED AT RECENT MEETINGS

The following are some of the subjects which have been discussed at conventions of the association and serve to illustrate the important matters relating to the accountants of electric railway companies which have been given attention by the association.

Statistics. The JOURNAL recently contained a short editorial on "Getting Useful Information Out of Masses of Statistics." The usefulness of statistics depends entirely upon their accuracy, and as most statistics originate from information compiled in the accounting department, it is very important that accounts be kept on a uniform basis, in order that statistics may be of sufficient value to justify their cost. Realizing the importance and necessity for statistics, the Accountants' Association has devoted a considerable amount of time to this subject on its programs. In 1898 an article on "Statistics, Their Use and Abuse" was presented by E. D. Hibbs; in 1903 W. M. Steuart presented a paper on "Census Statistics and Standard Form of Electric Railway Accounting"; in 1906 a paper by A. Stuart Pratt on "Use of Curves in Statistics" was presented and discussed; in 1909 a paper on "Interurban Statistics" was presented by S. C. Rogers; in 1911 a paper on "Statistics of Cost of Electric Operation on Steam Railways" was presented by A. B. Bierck; in 1913 an article on "Statistical Units Used in Analysis of Electric Railway Accounts" was presented by J. A. Emery; in 1915 George B. Willcutt presented a paper on the "Value of Statistics to Executive and Accounting Heads"; in 1916 W. E. Jones presented a paper on the subject of "The Statistician"; in 1919 an article was presented by C. R. Bitting on "The Preparation of Accounting and Statistical Data in Connection with Rate Cases."

Depreciation. This is a most important subject from an accounting standpoint and was so recognized as far back as 1897. In that year a paper on this subject was presented by H. C. McJilton; in 1906 another paper on the same subject was presented by R. N. Wallis, and in 1914 Robert Sealy presented a paper on "Accounting Treatment of Depreciation." In addition to these papers, depreciation has been discussed in connection with various committee reports and the subject is now being handled by the committee on a uniform classification of accounts.

Relation Between Accountants and Other Departments. This is an important subject and was covered by a paper in 1897 by P. V. Burington, in 1909 by W. B. Brockway, and in 1922 by E. D. Dreyfus, the latter paper referring particularly to the relations between the accounting and engineering departments.

Construction and Operating Budget. The budget system, which has been in use for some time by a few large utility organizations, is a subject of vital interest and, so far, has not been adopted by many electric railway companies, but the importance of this matter has been realized by the Accountants' Association. At the 1922 convention a very interesting address on this subject was delivered by Harry A. Snow, assistant comptroller of the Detroit Edison Company. This address has been published in pamphlet form by the association because of the importance of the subject and to comply with requests received for information on it. The association is preparing to develop this subject and has appointed a committee to study it and make recommendations as to a satisfactory budget system for electric railway companies.

Cost Accounting. The subject of cost accounting has been given considerable prominence in recent years and an address on this subject was presented at the 1921 convention by J. H. Bowman, C.P.A., of New York City, and at the 1920 convention a paper on "Cost of Service Accounting" was presented by H. J. Davies. In addition other papers have been presented from time to time on the subject of arriving at the proper unit costs, as the system of accounts for electric railways was not intended primarily as a cost accounting system.

Taxes. Accounting for taxes, both federal and state, has become a most important subject. It seems that, instead of simplifying the computation of taxes, taxing authorities attempt to complicate the provisions of tax laws, so that it is now necessary for nearly all large corporations to employ tax experts in handling their tax accounts. The question of taxes has been given attention by the Accountants' Association and is one of the live subjects to be discussed at future meetings.

Many other important accounting subjects have been discussed at the conventions of the associations, and when it is considered that the membership of this association consists of accountants who have been engaged in public utility accounting work for many years, the advantages of membership in the association cannot be overestimated. But in order to receive the benefits which may be secured through the association, members must take an active interest in its work.

During its twenty-five years of existence, the Accountants' Association has proved its worth to the electric railway industry, and its members intend to continue working in future along the lines which will prove of most benefit to the industry. The science of accounting has developed in recent years, and its importance is being realized more and more by the executives and owners of electric railway companies. If the association continues its activities in the future on the same lines as in the past, it will be recognized as one of the most important branches of the parent association, and its members will be held in esteem by all who are interested in the success of the electric railway industry. The members of the Accountants' Association are therefore urged to interest themselves in its welfare and to attend the conventions, with the assurance that they will benefit by meeting others engaged in accounting departments of electric railways and by a discussion of subjects which are of interest to every electric railway accountant.

Good Record for British Single-Phase Electrification

THE London, Brighton & South Coast section of the Southern Railway, Great Britain, has in operation a total of 70 miles of line electrified on the single-phase system at 6,700 volts. In a recent paper before the Institution of Civil Engineers, H. W. H. Richards, traction engineer of the railway, gave a summary of the results of twelve years of electrical operation. He said that the original bow collecting gear is still in operation, with slight modifications. The gear springs are set to maintain a pressure of 12 lb. of the bow strip on the contact wire with the latter at a height of 16 ft.

The motors used are of the Winter-Eichberg single-phase compensated repulsion type, which were satisfactory electrically but showed some mechanical weaknesses. These have been largely eliminated. Mileages up to 250,000 have been obtained with the split gears used, and double this mileage is expected with the solid gears. Little trouble has been caused by the transformers, of which there are seventy-one of the 310-kva. type in use. After ten years of service the sheet insulation between high and low-tension windings was replaced.

Gun-metal liners have been placed on the truck pedestal guides and other points of considerable wear so as to keep all clearances at a minimum. The Westinghouse automatic air brake, combined with clasp brakes and automatic slack adjusters, permits a rate of braking of 3 ft. p.s.p.s. to be made, and the brakes to be released in three seconds. General overhaul of motor coaches occurs after 60,000 miles have been made, or about every one and one-half years. The trail coaches are permitted to run for a period twice as long between overhaulings.

The effect of corrosion caused by steam locomotive smoke is seen in the fact that renewal of catenary and "dropper" wires is, in the non-steam traffic section, only 10 per cent of that in the sections where there is heavy steam traffic.

During 1921 the average energy consumption was 75.8 watt-hours per ton-mile. The number of coach-miles operated was nearly 6,000,000. The average distance between stops was 1.14 miles, the average running speed 24.36 m.p.h. and the schedule speed, including stops, 22.11 m.p.h.

Merchandising Transportation Abroad

Some of the Features on Which Greater Stress Is Laid than in America Are Destination Signs, City Waiting Stations, Attractive Rolling Stock and Overhead System

By J. KAPPEYNE
Consulting Engineer, Syracuse, N. Y.

WHILE the economic conditions and the attitude of the public toward electric street railways are not alike in Europe and in this country, some of the methods employed abroad to merchandise transportation and secure the good will of patrons may be of interest to operating properties in this country.

Thus, the first view on page 368 shows three distinct ways used on the trolley cars in Amsterdam to indicate the car route. First there is a route number (No. 14), conspicuously hung within the bow-shaped current collector. A variation in the first figure distinguishes the main car lines of the system, while a variation in the last figure indicates a different destination or terminal of the same main line, as in the case of short routing or of split lines. The route number is duplicated by a hood marker, shown at the right in the same illustration, and this marker is illuminated at night.

In the center of the hood is the usual route sign, which is square, oblong (as in the picture), circular, oval, diamond shaped, or of other outline and embodies a combination of two colors, such as red and green, red and yellow (as in the picture), green and yellow and so forth. Each shape represents a main route, similar to the first figure of the route number, while a variation in the coloring indicates a different destination, corresponding to the last figure of the route number. The shape and coloring of this illuminative route sign is duplicated in a marker at the right of the platform vestibule roof (at the left in the view). The route description is repeated on the side of the car roof on a board painted the same double color as the route sign. This double indication of routing insures correct advance information about the routing of an approaching car under nearly all possible conditions.

This same information, that is route number, route sign and route description is repeated at important traffic points on the car stop signs, as shown in the second view, and at waiting stations, third view.

Such route indication permits inspectors, policemen and others to give concise but nevertheless specific information as to the proper car to be taken. It also facilitates the condensing of instructions on transfers, time tables, public railway guides and similar useful information pamphlets. Above all, it clearly identifies the particular car in the mind of the intending passenger long enough in advance to permit him to be prepared to board that car with the self-satisfaction of knowing its certain destination and routing.

Another method of merchandising transportation service to prospective patrons was observed at congested loading points in Paris. A box, provided with paper tickets numbered consecutively (see fourth illustration), is attached to the trolley pole at a convenient height. During rush hours, each waiting passenger helps himself to one of these tickets. When the next car comes along, the conductor allows the passenger with the lowest numbered ticket to board first and thus





Routes Are Clearly Marked in Amsterdam by Car Signs and Numbered Poles

enables him to secure a seat if one is available. In this manner, the principle of first come first served is applied, with the result that the usual pushing and crowding at the car entrance is practically eliminated.

This method of loading has all the advantages of queue loading, but it eliminates the obnoxious feature of the latter of people having to stand in line while waiting. It has a wider field of usefulness, being applicable in cases where normally the number of waiting passengers would not warrant queue loading. Ticket loading is especially adapted, however, where the definite stopping place of the particular car is not predetermined, as in the case of multiple berthing, or of a near-side stop for converging car lines. It has the further advantage over queue loading in that it is self-instructing, as those slow to learn are being penalized.

A further catering to the comforts of one not yet a passenger, in quite common use in many cities on the Continent, is evidenced by the number of attractive, glass inclosed, waiting stations erected, as shown in the third view. These are often installed in the heart of the city at important transfer points and provide for news stands, boot blacking, parcel checking, candy and flower shops. They also serve as a convenient depot for transfers, extra car tickets, report blanks, etc., for the use of inspectors. Usually a company telephone and a public pay station will be found there.

In this country, the erection of waiting stations is usually confined to interurban lines, outside of the built-up area. Although traffic congestion and narrow streets, found in most business districts of our cities, militates against the establishment of such stations, with proper co-operation from city officials and interested property owners, suitable locations could probably be found in a surprising number of instances, where the construction of convenient waiting stations would result in greater comfort to waiting patrons.

Apparently many street railway managers abroad are believers in selling transportation "neatly wrapped and done up in an attractive package." The rolling stock, for example, is usually painted a pleasing color, such as pale blue, light olive green, cream color and others. The windows are broad and kept scrupulously clean and the brass fittings bright and shiny. More frequent use is made of ornamental trolley poles than in this country. In Antwerp I noticed ornamental combination arc light and trolley poles carrying flower pots with red geraniums. It may be that the providing of cream-colored cars, shiny conductor bells and flower-decked trolley poles is not directly remunerative, but a more general application in this country of attracting the car rider by a pleasing appearance of the property used is worthy of serious consideration.

Evidently the value of advertising within as well as without the cars is appreciated abroad, as shown in the fifth view. Monitor and dash advertising are common, and the company reserves the more conspicuous advertising space inside the cars for its own use. Here it displays maps showing the car system, lists of stopping places and transfer points, time-tables, company rules affecting the public, picturesque views of points of interest reached by street car, safety warnings, police regulations, etc. Much of this matter serves effectively as means of merchandising transportation.





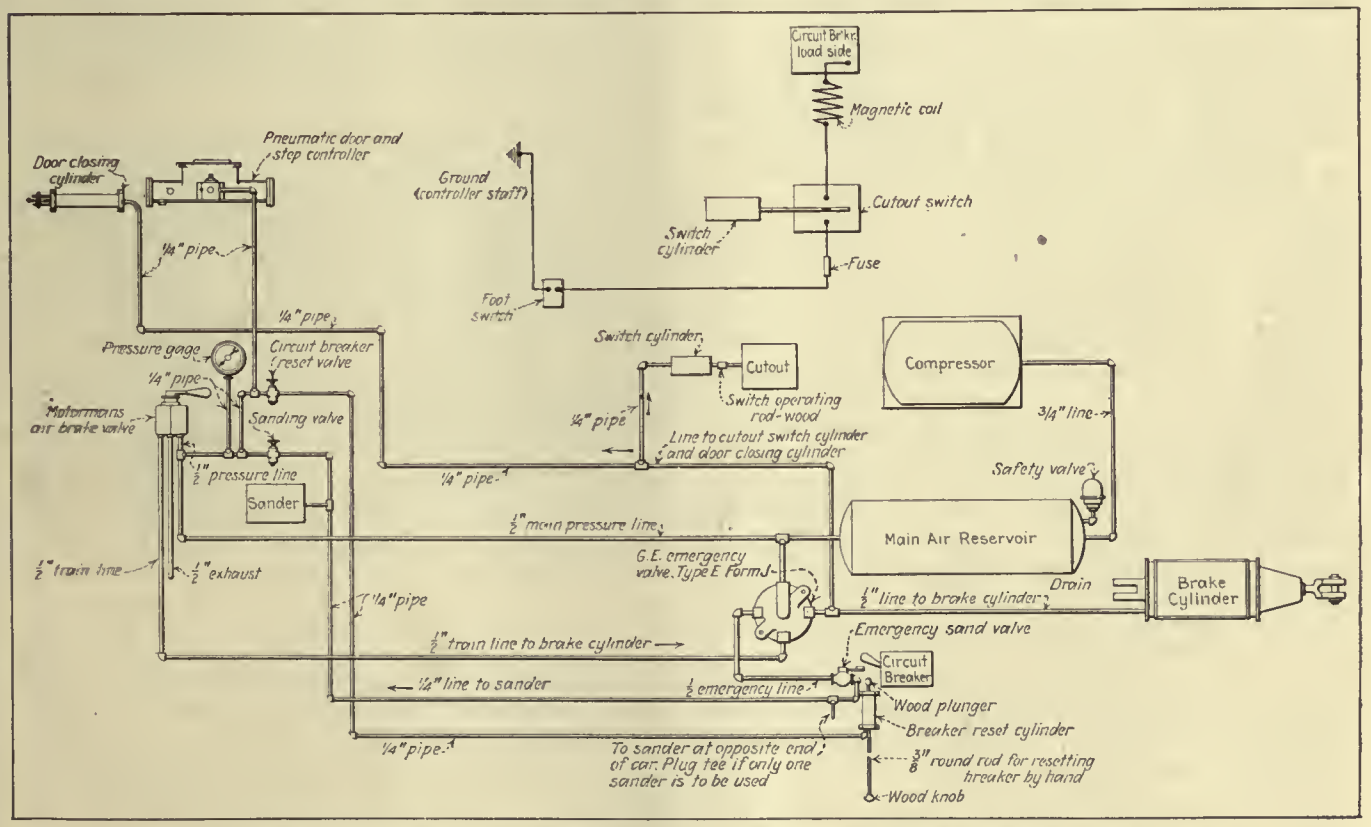


Amsterdam Waiting Station—Paris Queue Number—Lucerne Car With Monitor Deck Advertising.

New Safety Devices Developed in Tri-Cities

Scheme of Control Operates Electrically Instead of by Air Valves—Devices Claimed to Be Simple and Comparatively Inexpensive in First Cost and Maintenance

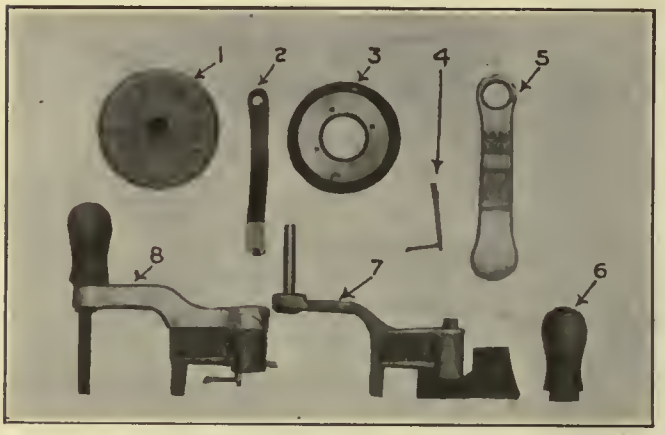
THE city railway service of Rock Island, Ill., has been operated entirely with converted one-man cars since March 1, 1922, and that of Davenport, Iowa, since June 15, 1921. A total of 128 double-truck cars of these two properties of the Tri-City Railway were changed over for one-man operation by the addition of a system of safety devices developed by John Sutherland, master mechanic. Forty cars of the Michigan Railway used in Lansing, Battle Creek, Jackson and Kalamazoo have also been equipped.



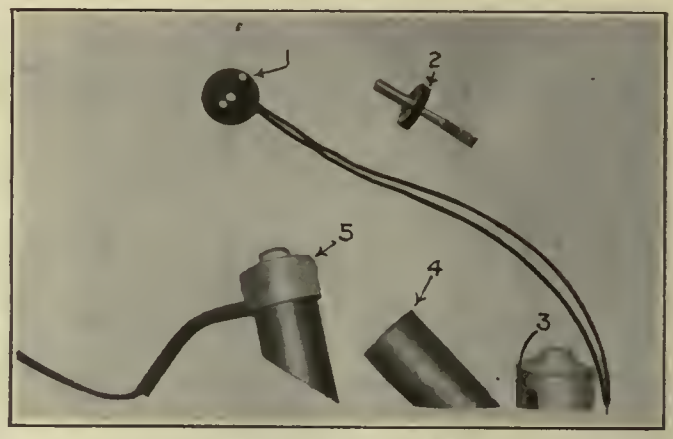
At Bottom, Piping Diagram for Single End Control. At Top, Wiring Diagram of Magnetic Control Circuit

Complete protection, reliability, low first cost and low maintenance expense, ease and cheapness of installation are the advantages claimed for the new development. The protection is obtained with several units that are positive in operation and simple in construction. A trip coil on a circuit breaker located underneath the car is actuated through a single control circuit using live current and connected with the controller handle. The plunger of this trip coil kicks out the breaker whenever the operator removes his hand from the controller, unless his foot is held on a floor switch. The controller handle and floor switch are in series with a cutout switch operated from the brake cylinder air pressure, so the circuit can be kept open by any one of these three contacts alone. Door protection is taken care of by connecting to the door engine valve an air cylinder operated by the brake cylinder pressure. To open the doors with the brakes off the operator must turn the door handle against a 40-lb. spring in the air cylinder. With the brakes on, the spring is compressed by the air entering from the brake cylinder, allowing free operation of the door control.

To describe the action of the safety devices, take a car in the shop with the pole down and no air in the reservoir. The operator puts up the pole and then pushes open the doors, which are released because the door engine with no air pressure offers no resistance. The compressor switch is closed and after the air pressure reaches 40 lb. or more the circuit breaker on the platform can be closed. It is in series with the one under the car controlled by a magnetic coil, but has a setting 100 amp. higher. An application of the brakes from the brake valve operates a cutout switch, thus making it unnecessary for the operator to hold down



Dead-Man Handle and Unit Parts
(1) Aluminum cap; (2) spring steel arm; (3) contact ring; (4) contact finger; (5) controller handle cap; (6) wooden knob; (7) brass controller handle; (8) assembled handle.



Foot Switch and Parts
(1) Fiber pin disk; (2) plunger with contact ring in position; (3) aluminum cup; (4) steel shell; (5) assembled switch ready for installation.

either the controller handle or foot switch. By releasing the brakes the doors automatically close.

The door control cylinder is identical in design with the cutout switch cylinder and both are piped from the brake cylinder. The control device on the door has a link sliding on the door engine valve rod so that when the brakes are released the spring tension holds a link against a collar on the rod, making it difficult for the operator to turn the short door lever against a 40-lb. pressure. When the car comes to a standstill after a brake application, the operator must keep the air brake valve set so as to permit air to travel from the pressure line to the train line. Thus a constant pressure is maintained in both the air-brake and the door-closing cylinders.

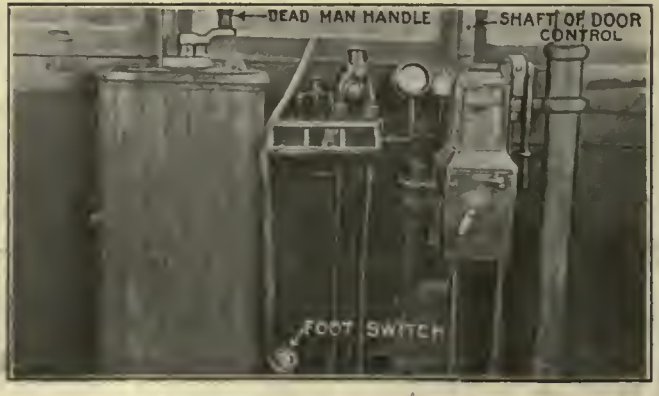
This releases the door and step mechanism so operator can easily turn the handle controlling the door-engine air valve. When the brakes are released just before starting the car, the air pressure in the door-closing cylinder is also released. A spring around the piston stem forces the piston back to its normal position and pulls the door-operating mechanism back to its original position. It should be noted that the control cylinder does not open the doors whenever the brakes are applied, but it does close them on release of the brakes.

When the circuit through the magnetic coil is closed, as upon release of the controller handle, the coil plunger strikes the breaker trip plate and the breaker, inclosed in a fireproof box underneath the car, opens. The breaker handle opens the emergency sand valve and holds it in the open position against the spring pressure. This permits the air to travel to both sanders. At the same time the emergency air line is opened and an immediate brake application results. Thus the car is brought to a sudden stop if the control circuit is allowed to close for any reason, and the full air pressure having built up in the brake cylinder, the door engine valve is again released.

The circuit breaker must be reset at once to close the emergency sand valve and allow the air pressure in the emergency line to build up until the valve resumes its normal position. A reset valve located convenient to the operator actuates a plunger that forces the breaker handle back to the operating position. If there is no air in the reservoir, the breaker can be closed by hand by means of an extension of the reset rod protruding to the side of the car.

The Tri-City cars are double ended, but only one door handle 4 in. long is allowed per car. On changing ends the operator removes this little handle and the brake valve and reverser handles. The controller handle remains attached. A convenient refinement of the device is a rod under the bumper on each end with which the operator can close the door after himself and keep the car warm should he leave the car for any reason at the end of the line. This appurtenance is operative only when the 4-in. handle inside the car is in place. Thus no one familiar with the trick can open the rear door from the outside. The feature was obtained by using a rod joining into a pipe for operating the door valve. The rod and pipe are connected only when the 4-in. handle is screwed through a slot into a hole tapped in the rod.

In operating the cars equipped with this type of safety device the men become accustomed to keeping one foot on the floor switch or holding onto the controller handle.



Operating Platform Showing the Arrangement of Safety Control Devices



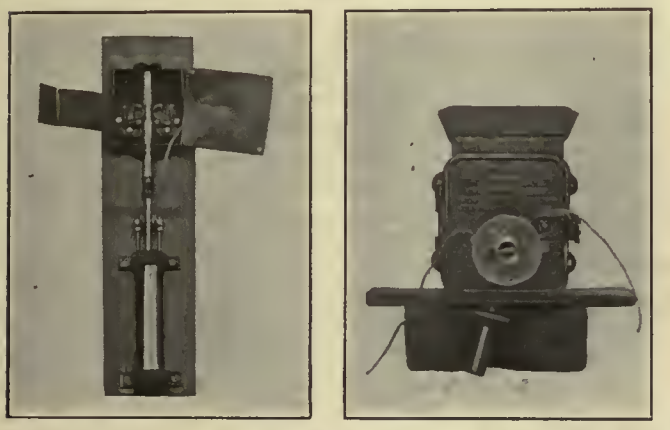
Cylinder Controlling Door Engine Valve Located on Front Bulkhead

The cutout switch breaks the circuit through the magnetic coil when the car is stopped, thus allowing the operator to release the controller handle and foot switch.

Several of the accompanying illustrations show the location of the various elements. With the door engines over the doors, the control cylinder was placed over the dash window. The cutout-switch cylinder is placed under one of the front seats. Were there room on the bulkhead the same cylinder could be used for both purposes. One of these switches, mounted on a board, ready for installation, is shown herewith. With the spring in the cylinder fully released, the contact rod takes the position shown and the electrical contact is made through the two hinged brushes. With sufficient air pressure the brass sleeve on the rod is pushed away and the two brushes are thus held apart with the wooden rod.

Details of Controller Handle and Foot Switch

The adapted controller handle and the foot switch, which constitute the remaining devices controlling the circuit breaker operation, are illustrated, also showing the assembly and the detail parts. The controller handle is designed so that a very light pressure on the handle holds open the circuit. A positive action has been obtained with a vertical movement of the knob of about ⅛ in. A standard handle (2) is stripped as shown and an L-shaped contact finger (4) designed to pass through a groove machined in the controller shaft with ample clearance. The end of this finger can make contact with a brass ring mounted on a larger fiber contact ring (3) that is screwed to the controller cover.



At Left, Unit Assembly of Switch and Cylinder Operated from Air Reservoir Pressure. At Right, Circuit Breaker Adapted by Addition of Trip Coil

Engaging the upper end of the contact pin is a steel arm bent to slightly less curvature than the controller handle and one end of which is bored to pass over the knob pin. In this position the bend in the controller handle acts as a fulcrum for the steel arm, which is counterweighted on one end to overbalance the effect of the wooden knob. An aluminum cap (5) is fitted over the assembly and another cap (1) is applied over the contact ring. The controller points are indicated on it to replace those ground off the cover when the ring was screwed on. The completed handle has only three moving parts.

Another view shows the foot switch, which normally is held closed by a spring. The shell (4) is cut from 3-in. steel tubing, one end at a 45-deg. angle. The inside is bored to a slightly larger diameter to form a shoulder, against which is inserted a fiber disk. This acts as the lower guide for the plunger (2), while a similar disk with two contact pins fits into the top. The circuit between the contact pins is completed by a brass ring on the plunger disk. The inside of the steel shell is insulated with a micarta tube. An aluminum cap is screwed onto the end of the plunger shaft and it extends over the tube far enough to prevent the entrance of snow or water. Another view shows a standard circuit breaker adapted for tripping with a magnetic coil that is attached to the cast-iron box.

The cost of applying the safety equipment, including labor and material, averaged less than $600 per car. The patents for this method of protection for one-man operation are held by John Sutherland, master mechanic of the Tri-City Railway properties. The devices are manufactured and sold by Nic Le Grand, Inc., Rock Island, Ill.

Would "Sell" Detroit Municipal Railway to Detroit People

Consultant Uses Opinions of Municipal Railway Engineers for Report to Give Publicity to Faults of D.U.R. Track, the Rehabilitation Work Done and Merits of the New Construction

THE first of what is presumably to be a series of bulletins prepared by Walter Jackson, consultant, apparently for the purpose of keeping the people of Detroit sold on their municipal railway system, has been made public. This bulletin is printed in the form of a four-page leaflet under the heading of "What Was and What Is on the Street Railway System." A subheading explains that the report is an "analysis by a technical specialist of the conditions and practices on the city's own system prepared that the general public may intelligently watch developments and adequately gage the policies being executed." Further explanation of the report is set apart in a box as follows:

"The purpose of this report is to present an analysis of the operation of the Department of Street Railways, City of Detroit, along the following lines:

"1. The condition of the property when taken over from the Detroit United Railways; first, as regards the degree of deterioration; second, as regards the character of construction, equipment and practices regarded as good by the predecessor organization.

"2. The condition of the property today; first, as regards the extent of rehabilitation; second, as regards the character of construction, equipment and practices regarded as good by the successor organization.

"3. A comparison of the municipal standards with the practices and tendencies of the American electric railway industry at large.

"4. Suggestions that may tend to make the Department of Street Railways of the City of Detroit the most capable mass transport concern in America."

The report then takes up a discussion of the physical condition of the track which was taken over from the Detroit United Railway. The report of the engineer of the municipal system to the general manager of the municipal system is drawn upon for extensive quotations about the disrepair of the D.U.R. track. A summary is then given of the extensive trackwork done during 1922 from May 15, the day on which the property was taken over, up to Dec. 31, 1922, in bringing the D.U.R. system

up to operating physical standard. This summary was as follows:

New track construction (ft. of single track)	5,539
Track reconstructed (ft. of single track)	49,449
Falk cast-weld joints replaced	2,890
Tons of steel used for special work renewals	1,055
Track repaired (ft. of single track)	70,469
Pavement replaced, sq.yd.	42,641
Concrete foundations replaced, cu.yd.	1,811

"From this greatly condensed statement," the report goes on, "it will be apparent that the track and paving needed early and earnest attention if service was to be given with any degree of reliability. Track reconstruction is the most costly work an electric railway has to face, so that it is not to be wondered at that the Detroit United Railway refused to spend thousands of dollars for a new crossing if it could bump along until the end of its expected departure from city operation. Had the purchase negotiations moved faster, the property would have been in correspondingly better condition for safe and comfortable operation."

Discussion of D. U. R. Construction

As to the standards of track construction used by the Detroit United Railway, Mr. Jackson has this to say:

"Any kind of equipment, no matter how good, has to be cared for to give smooth service. We know that during the last two or three years of its tenure, the predecessor company naturally did no more than it could avoid doing and with this policy no one can find fault. However, a different question arises when we consider the character of construction in itself and ask whether it represented the best types available for the job. In other words, were the track standards of the Detroit United Railway the best standards—if we assume that the company had continued to operate with the usual degree of care in upkeep and renewal of the structure."

Here follows a summary of the mileage of each type of D.U.R. track taken over with the corresponding comment of the municipal railway engineer as to its faults. Mr. Jackson adds the comment that "From the foregoing it will be seen that while the concrete and wood tie construction adopted as a Detroit United standard conformed to the ideas of many track engineers, the use of such construction with a non-waterproof paving led to a deterioration that may have been hastened by neglect in the last uncertain years but which appears to have been inevitable in any case. At any rate, the experience of the Detroit United Railway has been the strongest reason for the use of the much different track construction described hereinafter."

Similarly, the practice of cast welding the joints is criticised with the comment that the D.U.R. "seems to have been one step behind the latest developments of the art." The report then takes up a discussion of the type of track construction adopted by the municipal railway and quotes articles and editorials from the ELECTRIC RAILWAY JOURNAL at length to establish the merit of the municipal construction work.

Reference is made to the matter of rail corrugation, which forms an answer to some critics who have associated corrugation with the rigid type of construction used by the municipal system. The report points out that a stretch of 6 miles of open track with wooden ties, constituting as flexible track as one could desire, had developed corrugation. It also brings out that the railway's engineer made the telling point that the corrugation in rigid track had been confined to the 100-lb. section of rail, whereas if it were a condition due to stress of car operation, one would look for it in the 91-lb. and 93-lb. sections first. It is then pointed out that no one knows the dominant cause of corrugation. Finally Mr. Jackson indorses the Detroit Municipal construction in this manner:

Indorses Construction Used by City

"The combination of steel ties, concrete foundation, electric welded joints and compressed concrete paving is the last and best word in track construction of the rigid or monolithic type. This construction does not oppose the modern tendency toward monolithic street paving but works with it. The department's design actually reinforces the rest of the paving, whereas the so-called flexible track using wooden ties and block paving would tend to break up adjacent paving owing to the up and down movement of heavy cars running over wood."

The report is then concluded with the following comments:

"If any electric railway is entitled to relief from the paving burden, it is one like the Department of Street Railways because the latter has adapted itself completely to the type that is best for all other users of the public highway.

"The use of electric welding between the rails themselves and between rails, steel ties and mechanical connections means that the Department of Street Railways has taken more precautions to avoid electrolysis than any other electric railway in the world.

"No other electric railway has made such extensive use of the 'best quality' standards or specifications of the American Electric Railway Association, nor constructed track with such a modern array of labor, time and nuisance-saving appliances. Finally, a big advance in labor policy has been made by grading the men so that the more capable individuals will remain with the department throughout the year instead of drifting into other employment and thus making it necessary for the track division to break in too large a number of new men.

"A patchwork policy may give the older track three or four years more of useful life; a reconstruction policy will settle the track question for a generation. The answer lies with the public."

The Readers' Forum

We Strive to Merit This

HARRISBURG RAILWAYS COMPANY
HARRISBURG, PA., Feb. 26, 1923.

To the Editors:

I want to take this opportunity of congratulating you on your Feb. 24, 1923, issue of the ELECTRIC RAILWAY JOURNAL.

This is one of the best issues, to my mind, that the ELECTRIC RAILWAY JOURNAL has ever placed before the public and you are to be congratulated for the articles that it contains and the general make-up. In fact, I think you have set a standard by this issue that will mean a considerable amount of work on your part to maintain during the year. This is really an issue that should be placed in the hands of every operating man in the industry in the United States.

C. F. CRANE,
Assistant to the President.

Americanization Work Proving Successful

Intensive Effort Among the Employees on the Insull Properties Results in Practically All of Them Becoming Citizens

AMERICANIZATION work among employees of the Chicago, North Shore & Milwaukee Railroad, Chicago Elevated Railroads and other public utility companies under the direction of Samuel Insull, Chicago, has established a record believed to be unique among the industries of the country. For the last eighteen months intensive Americanization effort has been carried on among the employees of the six public service companies, with a result that today practically all employees are either American citizens or have declared their intentions of becoming such and have taken out their first naturalization papers.

A report just made to Mr. Insull by the joint committee in charge of the Americanization work shows that on Jan. 1 the aggregate number of employees on the payrolls of the combined companies was 24,214, and of this number, 22,270, or 91.97 per cent, were American citizens. Those who were in possession of their first papers and who will gain the full rights of citizenship within the next few months number 1,893, or 7.82 per cent. Only fifty-one or 0.21 per cent were not citizens or had not taken out first papers. Some of those who had not yet declared their intentions of becoming citizens expected to do so within a few weeks.

The report shows that out of 5,488 employees of the Chicago Elevated Railroads, 5,107 were citizens, 379 had taken out their first papers and only two were non-citizens. The Chicago, North Shore & Milwaukee Railroad had 1,350 employees, of whom 1,231 were citizens, eighty-seven had taken out their first papers and thirty-two were non-citizens, most of whom expected to apply for their first papers within a short time.

Back of these interesting statistics is a record of intensive Americanization work, which in reality, to a large extent, was education of the foreign-born employees to speak, read and write the English language and do simple problems in arithmetic. As the work advanced, its scope was broadened to include instruction in the science of government and the meaning of American citizenship.

North Shore Line Benefits Particularly

The most difficult of the situations encountered in this Americanization program fell to the lot of the Chicago, North Shore & Milwaukee Railroad. Trackmen employed by that company were largely aliens, as is usually the case with workers doing this class of labor. Altogether, fifteen nationalities were represented, with Croatians and Italians predominating. At the time the work was undertaken, few of them could read or speak the English language and some of them could not even read or write their native language. They lived mostly in camps located at various points along the right-of-way, so that making them American citizens presented a problem altogether different from that of any other company in the group.

As usual, these men were hired through labor agencies. After a brief survey of the situation it became apparent that little in the way of improvement could be accomplished by the customary practice of working through foremen and labor agencies. It was a difficult problem to carry on Americanization work under these conditions as it was not a simple proposition to convince employees that they should become American citizens. It was a question of educating them to make them fit for citizenship by instruction in the English language.

The first step was orders from Britton I. Budd, president of the company, discontinuing the practice of keeping labor in boarding camps maintained by contractors and the establishment of a system of company camps constructed and maintained to attract the better class of men and keep them contented. The commissary was improved, baths were provided, close attention given to cleanliness about the camp and a Y. M. C. A. secretary was employed to keep after their recreation.

After a further study of the situation it was decided that although this work was a step in the right direction, a systematic course of education should be established to assist these foreign-born employees in becoming citizens. The magnitude of this task will be more readily comprehended when it is understood that the first survey showed that 90 per cent of the men were not citizens, over 30 per cent of them could not speak English, 75 per cent could not read it, and 25 per cent could not read or write their own language. The ages of the men ranged from eighteen to sixty years and averaged thirty-six years.

The company engaged an experienced instructor to direct the work and he was assisted by men in the organization. Schools were fitted up in buildings belonging to the company at various locations along the line. Classes were held on specified evenings at different locations most convenient to the men.

The first step was instruction in English. Later, as the work progressed, English was supplemented with simple courses of study in grammar, arithmetic and government. The instruction was associated with the work the men were actually doing. For example, in arithmetic, a problem like this would be given: If 250 ties are unloaded for renewals in track and 65 ties have been renewed, how many ties are left? This system of instruction promoted interest and enlarged upon the value of the work to the men. Motion pictures were used often as a method of keeping the study interesting.

Beginning late in 1920, two hourly classes were held on two evenings of each week, excepting for two months during the summer, when the program was confined to pictures and recreational pastimes.

As an indication of the interest taken in the work by some, one man over forty years of age, who, though many years in this country, had not learned the English language, said to an interpreter at the close of the first lesson: "I would rather learn English than have $1,000."

After several months of this intensive educational work a certain day was set as "first paper day," upon which all foreign employees who had not yet declared their intentions of becoming American citizens could do so. Arrangements were made to receive the applicants at the courthouses in Waukegan, Ill., and Kenosha, Racine and Milwaukee, Wis., and the day was made a gala occasion. As a result of this, the number of employees among the trackmen who were not citizens dropped from 90 per cent to 27 per cent.

The educational work proved such a success that it is being continued. A school has been started for foremen and all who desire to become foremen. Safety classes are also held and accidents have been reduced to a minimum as a result of education of this sort.

Association News & Discussions

Mr. Lieb Talks About Coal Situation

Representative of the Utilities Points Out the Causes of the Problem and Discusses Remedial Measures, Showing How the Expansion of Utility Service Tends Toward Solution

AT THE February luncheon meeting of the New York Electrical League on Feb. 28, John W. Lieb, vice-president New York Edison Company, and chairman of the joint fuel committee representing the national electric light and power, railway and gas interests, addressed the meeting on the outlook in the coal situation. His primary intent was to set forth the way in which the electrical industries have been affected by conditions in the coal industry and how they are serving the nation in the conservation of fuel and simplification of its distribution.

Working in this direction, he first undertook to show the essential importance of the utilities, presenting some statistics as to the magnitude of the investment and the great importance of their service to the public. He laid great stress upon the fact that the electric, gas and street railway utilities must function and that for the public good, they should be placed beyond any danger of failure to obtain adequate quantities of proper fuel.

Mr. Lieb reviewed the great difficulties the utilities have had during the past few years in getting coal with which to keep up continuous operation, and how the critical conditions in the coal market have practically nullified the effect of coal contracts and have forced abandonment of any pretense of holding to any minimum specification on coal analysis. To show how more extended use of central station energy would tend to improve the problem of coal distribution, as well as its conservation, Mr. Lieb said that isolated power plants consumed in 1922 about 20 per cent of the total coal mined. This was compared with 6.7 per cent of the total which was consumed by the utilities, indicating the high fuel economy of the utilities when the relative outputs of electrical energy are compared, since these utilities generate annually more energy than the aggregate produced by all isolated industrial plants.

Turning to the mining operations, Mr. Lieb said that there was an increase of 154 per cent in the number of mines operated in 1920 compared with the number in 1910, with an increase in annual capacity to over 800,000,000 tons, while the actual demand reaches only from 500,000,000 to 600,000,000 tons. This great excess development of new mines as compared with output has seriously interfered with healthy conditions in the coal business. The resultant irregularity of production has been great; thus, in Illinois, in 1921, the average number of days per mine worked was only 131, and for the country as a whole in that year it was 149 days. Similarly, the amount of labor available at the mines is excessive. About 74,000 men were employed in Illinois in 1921, when 42,033 men could have performed the service by working a more reasonable number of days in the year. For the whole country in the same year, 663,000 mine workers were employed, producing only 415,000,000 tons, while in 1910 to produce 417,000,000 tons only 556,000 were required.

In addition to this increase in number of miners employed, the average annual output per mine decreased from 71,559 tons in 1910 to 38,612 tons in 1920. This would of course involve a serious increase in overhead costs per ton for much of the coal produced. Under any conditions the irregularly employed men of the coal regions, plus the extra expense of non-steady production at the mines, is reflected in the excessive prices of coal, which have to be borne by the ultimate consumer.

Railways Seriously Affected by Overdevelopment of Mines

Mr. Lieb then discussed the effect of mine and railroad strikes on the supply of coal during the past few years and commented on the enormous fluctuations in price. Continuing, he said that the opening up of an excessive number of mines previously referred to had had its reflection on the railroad situation, making it necessary for the railroads to divide their available cars among over 2,900 mines in 1918 and 6,800 more mines in 1920 than would have been necessary had the average production per mine in these years been maintained on the 1910 basis. Gathering the increased tonnage from a largely increased number of mines calls for vastly increased motive power, coal car supply and manpower from the railroads to serve them all.

The number of cars called for based on the rated ability of the mine to produce coal kept pace with the increased number of mines until for the year 1920, cars were ordered in sufficient number to load over 830,000,000 tons—56 per cent more than the total consumption of the country. In the latter part of 1922, cars were called for at the rate of twice the annual consumption of the country.

While it is stated that the railroads have provided in 1920, as compared with 1911, an increase of 42.5 per cent in tonnage capacity of coal cars, 55.1 per cent in new motive power and tractive effort, and have provided 40 per cent increased investment in road and equipment, it is nevertheless true that car shortage did dislocate the steady flow of coal to the consumer, and it may be said, generally speaking, that car shortage periods are closely related to and are the result of labor trouble in both coal and transportation industries.

Mr. Lieb said that the inadequacy of car supply is also intimately related to the system of mine ratings for car assignments and it is expected that the federal coal commission may bring forward valuable suggestions.

Remedial Measures Considered

Turning to remedies that have been proposed to stabilize the coal business, Mr. Lieb said that as yet the United States Coal Commission, after several months of intensive study, has not been convinced that a proper solution has been found. One important group of those interested advocate in essence that the situation be allowed to work itself out without external government or other interferences. Their contention is that the coal industry, under the ordinary laws of competition and of supply and demand, was as stable prior to the war and as satisfactorily operated as any other industry. They claim that the recent difficulties are an aftermath resulting from war conditions, and that these will rectify themselves with time. They believe, if unrestrained by artificial means, that the excessive development of mines will be reduced in the natural course of business through the less efficient schemes worked out by competition. This in turn will cause the excess mine labor to enter other pursuits. The result of such a natural movement would, they say, tend to increase the steadiness of the workings

Forthcoming Meetings of Interest to Electric Railway Men

March 12-14—Oklahoma Utilities Association, Oklahoma City, Okla.
March 22—New England Street Railway Club (annual meeting), Boston, Mass.
March 14-15—Illinois Electric Railway Association, Chicago.
March 19-21—American Railway Association, Engineering Division, Chicago.
March 22-23—Wisconsin Utilities Association, Milwaukee, Wis.
May 7-10—Chamber of Commerce of the United States, New York.
May 15-17—Southwestern Public Service Association, Ft. Worth, Texas.
June 27-29—Central Electric Railway Association, Cedar Point, Ohio.

of the mines remaining and give steadier employment to the miners. All of this would mean greater economy and lower cost of production.

The second suggestion which Mr. Lieb said had been made is that the government itself purchase and operate the mines. This plan, although vigorously and continuously promoted by a group of the more radically inclined, has been quite universally condemned by the public on the ground that government ownership and operation have not proved either efficient or economical and experience with the railroads under government management has not been such as to encourage further experimentation in that direction.

It is more or less self-evident that under government operation at least a large proportion of the mine officials and probably workmen would hold their positions not primarily upon merit, but in many cases because of their individual political affiliations and influences. It has usually been found, Mr. Lieb said, that the public is better served and better protected under the natural laws of business than through governmental interference and political control. Several bills have already been introduced in Congress having to do with the various phases of governmental control. Thus, one bill provides that long-time coal contracts may be recorded with the Interstate Commerce Commission and that when crises arise, a mine shall supply its recorded contracts with coal before it supplies other customers. Another bill provides that anthracite coal shall be graded into classes and that coal operators and dealers will be subject to penalty for shipping or selling coal which is not in conformity with the grade represented or contracted for.

Finally, plans have been proposed whereby, through the extension of the storage of coal by all users, the seasonal variation of prices of coal and possibly seasonal variations of freight rates, by conservation of energy in the use of coal, and by simplifying its distribution, conditions can be materially improved.

Railroads Should Store Coal

Mr. Lieb then discussed the advantages of storage and pointed out that the utilities have long been practicing this measure in an extensive way. In fact, it was the storage of coal by the utilities in advance of the strike of 1922 which practically saved the situation. Mr. Lieb said that larger storage capacities for all coal users, to be filled in times during the year when transportation facilities are best available, would do much to prevent the present unsatisfactory fuel conditions. The railroads themselves should, in as great measure as possible, haul and store the coal for their own needs. They use approximately one-third of the bituminous coal consumed, and thus they are in an excellent position to aid to a much greater extent than in the past in stabilizing both the coal industry and their own operations through such methods.

Further, Mr. Lieb pointed out that the mines can in a certain measure promote storage which would prevent irregular daily production output from the mines, caused by variations in daily car supply. In many locations a coal pocket holding from one to two days output may be installed at a moderate expense and so arranged as to discharge directly into the railroad cars with little additional equipment and no additional handling. Such a storage should enable the mine to run continually at least five days per week and the slight additional cost would be largely overbalanced by improved showing in the overhead per ton of coal produced. The overhead expenses go on while the mine is idle.

These expenses amount to about 40 per cent of the total cost of the coal on the car. Those mines which have installed storage of this kind find that under most conditions the car supply is equalized and that definite advantages result from the practice.

A greater application of electrical equipment in coal mines would also tend to improve the situation, the speaker said. As to the possibility of locating electric generating stations at the mine mouth, Mr. Lieb said that this was possible only in comparatively few cases. The project of pumping coal through a pipe line has been considered by many engineers and its feasibility has been shown, at least theoretically. A proportion of 50 per cent by volume between material and water can be maintained. At 10 ft. per second, which is not excessive, a 14-in. pipe would carry over 7,000,000 tons of coal per year, and this delivery is independent of the length of the pipe. He said that at the present time it is estimated that the cost of delivering a ton of coal, including fixed charges from Scranton, Pa., to the New Jersey side of the Hudson would probably not exceed 50 cents a ton, to which would have to be added the ordinary charges for lighterage and handling in the Port of New York. Mr. Lieb also touched upon the working out of super-power systems as tending to solve the problem.

Mr. Lieb concluded his address by an appeal for the necessity of state regulation. Referring to the great possibilities which the utilities offer in conserving coal and simplifying its distribution, he said that it will be impossible for them to develop or give good service to the public if subjected to the harassing interferences of all of the municipal or minor political establishments through which they may extend and in which they operate. Nor will such a consummation as the public desires and the companies wish to provide be possible unless state-wide regulation of a broad and equitable character is maintained and the laws and rulings governing the utilities are of a helpful and stable character and such as to attract the large quotas of capital which it is necessary to obtain each year to provide for the rapid extension of the public utilities in order that they may serve the public adequately, efficiently and economically.

Association in Maryland

THE Maryland Utilities Association is the latest utility organization, the initial meeting having been held at the Engineers' Club in Baltimore on Feb. 20 and 21. The morning of Feb. 20 was devoted to a general meeting, and in the afternoon the association divided into three sections: Electric, gas and water. On Thursday evening there was a banquet at which the speakers were Governor Ritchie of Maryland, W. R. Voorhis, vice-president American Water Works & Electric Company and Senator Orlando Harrison. On the morning of Feb. 21 there were also section meetings with papers and addresses. More than 170 delegates were present.

The officers of the new organization are as follows: President, Hon. Emory L. Coblentz, Frederick; vice-president, Charles O. Culver, Salisbury; secretary and treasurer, H. T. Connolly, Annapolis. The board of directors consists of six members as follows: Joseph W. Lynch, Hagerstown; Luther D. Shank, Centreville; A. N. Tawes, Crisfield; T. E. Bullock, Baltimore; George W. Woolford, Cambridge, and Louis H. Palmer, Baltimore.

Mr. Coblentz, the new president, is chairman of the board of directors of the Potomac Public Service Company.

C.E.R. Accountants Meet at Lima

FOUR excellent papers were presented at the forty-fourth meeting of the Central Electric Railway Accountants' Association, held in Lima, Ohio, Feb. 23 and 24. The authors were Robert R. Peery and J. B. Mahan, Terre Haute, Indianapolis & Eastern Traction Company; A. R. Baxter, Indianapolis & Cincinnati Traction Company, and A. W. Heath, Chicago, South Bend & Northern Indiana Railway. Abstracts of these papers will be published in a later issue.

The following officers were elected for the coming year: President, Karl A. George, auditor Northern Indiana Power Company, Kokomo, Ind.; first vice-president, L. W. Van Bibber, auditor Indiana, Columbus & Eastern Traction Company, Springfield, Ohio; second vice-president, J. P. Longon, auditor Cincinnati & Dayton Traction Company, Dayton, Ohio; secretary-treasurer, L. E. Earlywine, Traction Terminal Building, Indianapolis, Ind.

The executive committee elected comprises: H. F. McColgin, auditor passenger receipts Interstate Public Service Company, Indianapolis, Ind.; John Cummings, auditor Wheeling (W. Va.) Traction Company; Tudor W. Jones, auditor Union Traction Company of Indiana, Anderson, Ind.; H. O. Welmer, auditor Winona Interurban Railway, Warsaw, Ind.

It was decided to hold the midsummer meeting at Cincinnati, Ohio, July 27 and 28. There will be a one-day session in Cincinnati and the association will make a trip by river packet from Cincinnati to Louisville, Ky., and from Louisville to Indianapolis by the Interstate Public Service Company's line.

Wisconsin Utilities Association

THE Wisconsin Utilities Association, which includes the gas, electric and street railway companies, will hold its annual meeting on March 22 and 23 at the Hotel Pfister, Milwaukee. The Wisconsin State Telephone Association will hold its sessions at the Wisconsin Hotel, March 21, 22 and 23. A joint session of both associations will be conducted at the Pfister on the morning of March 23. It is expected that nearly 1,000 utility men will be present.

The program for the joint session will include reports from J. P. Pulliam, Milwaukee, president of the Wisconsin Utilities Association; Arthur Taylor, Rhinelander, president of the Telephone Association; John A. Pratt, Madison, secretary; Bruno Rahn, Milwaukee, chairman gas section; C. R. Phenicie, Green Bay, chairman electric section; B. W. Arnold, Oshkosh, chairman electric railway section; A. E. Gerg, Fond du Lac, sales section; and C. E. Kohlhepp, Milwaukee, accounting section.

James P. Barnes, Louisville, Ky., and John B. Malig, New Haven, Ind., will make the principal addresses. Group luncheons of executives, engineers, accountants, superintendents, advertising and sales men will be held at noon. Several other speakers whose acceptances have not as yet been received will be on the general session program.

Chairman B. W. Arnold announced the following program for the electric railway section:

"Education of Electric Railway Employees," by Edward J. Blair, Chicago.

"Pneumatic Operation of Car Doors and Steps," by Oscar Broten, Chicago.

"Maintenance Problems of Track and Overhead," by Albert A. Oldfield, Oshkosh.

"Automobile Street Car Collision Statistics," by R. M. Howard, La Crosse.

"Selling Transportation," by F. W. Shapport, Chicago.

"Business Ethics," by Oscar Stotzer, Milwaukee.

The papers will be discussed by Dudley Montgomery, Madison; C. E. Warwick, Green Bay; Nels Rasmussen, Wausau; Clyde Hedges, La Crosse; John St. John, Cedarburg; A. J. Goedjen, Menominee; C. C. Shockley and J. A. Phelan, Rockford; Joe Jessart, Green Bay; H. G. Menger and J. H. Lucas. Milwaukee.

American Electric Railway Association Convention

It has been decided that the 1923 convention of the American Electric Railway Association shall be held at

Atlantic City

during the week commencing

October 8

and that there shall be an exhibit of the apparatus and equipment available for use of the electric railways.

American Association News

Heavy Traction

THE Engineering Association committee on heavy traction met in New York City on Feb. 20, to review the progress made to date on the several assignments. The committee learned with satisfaction that the American Association executive committee had made an appropriation to provide for a careful revision of the committee's bibliography on heavy traction. This work will be assigned to an expert on indexing, and the committee will supplement his work by bringing the bibliography up to date. The committee feels that this is one of the most important pieces of work to which it can address itself, as a reliable and permanent index to important articles in the field will form the basis for research in this subject and will reflect credit on the association.

The committee devoted particular attention to self-propelled vehicles, which was the subject of a comprehensive report by the 1912 committee. In view of the renewed interest in self-propelled rail cars the committee will bring the data of the earlier report up to date by sending out a comprehensive questionnaire to all known operators of these vehicles. The list will be compiled with the co-operation of manufacturers, an extended list of which has been compiled. The questionnaire will be complete enough to permit a study of the operating conditions of the rail-car lines, as well as the details of the vehicles. The investigation will cover steam, oil, gasoline and electric motive power.

At the meeting progress was reported regarding the compilation of data on American and foreign electric locomotive development, and on the digesting of the results of the work which the committee has performed during recent years.

The meeting of the committee was attended by Sidney Withington, New Haven, Conn., chairman; J. M. Bosenbury, H. W. Coen, J. C. Davidson, and J. V. B. Duer, Norman Litchfield and L. S. Wells.

On the Steps of the Executive Offices of the White House



The party of electric railway men at the White House who were received by President Harding at the time of the Midyear Conference of the American Electric Railway Association in Washington, Feb. 16. The news of this and the names of the men were published in the Feb. 17 issue of ELECTRIC RAILWAY JOURNAL, which contained the full report of the meeting.

Committee on Welded Rail Joints

SUPPLEMENTING the report of the meeting of the committee on welded rail joints and of the executive committee, given in last week's issue of this paper, the following additional information will be of interest to electric railway men:

At the meeting there was considerable discussion as to the way in which the joints which are to be submitted for tests should be made up. It was decided that joints for straight track should be made under service conditions wherever possible, and in cases where this is not possible a detailed description of the actual condition is to be furnished to the committee. The test joints are to be made early this spring.

The tensile and conductivity tests are to be made at the United States Bureau of Standards in Washington, the drop tests at the University of Illinois, Urbana, and the bending tests at Purdue University, Lafayette, Ind.

Maintenance of Equipment

Cleaning Armature Coils by Boiling

THE problem of cleaning used armature coils has been one that has puzzled most armature-room foremen and master mechanics. Aside from the time and labor required by the scraping method, the danger of damaging the coil through the use or misuse of a sharp tool also arises. With the old method, two men, usually helpers, would strip what mica was possible from the bars and then scrape the remainder off with putty knives or special chisels.

In a new process, as used at the shop of the Metropolitan West Side Elevated Railway, the coils are stripped as before. They are then placed in a boiling vat heated by steam. A solution of "Okite" and water, 5 lb. of Okite to 10 gal. of water, is used as the cleaning agent. Boiling for five hours, wiping with a soft cloth and drying in an oven is all that is necessary. No damage is done to the coils and much labor is saved. This process has been used on commutator segments with equal success and a corresponding saving in labor. From information obtainable, labor time required for hand scraping a set of coils is forty-eight man-hours, that is, two men working three days, while that required for the boiling process is one and one-half man-hours.. The one and one-half hours for one man represents labor time required to strip coils, handling to and from boiler, wiping, handling to and from oven, and preparing for tape machine. This means a total of six and one-half hours from start to finish of process compared with three days for two men in the old process. It has been found that coils and bars subject to this process take tinning more readily than scraped ones.

Old Compressor Motors Useful

IN THE maintenance shops of the Eastern Massachusetts Street Railway in Fall River the corner occupied by the blacksmith contains several interesting stunts. One is the way in which two retired compressor motors are used in connection with the forge. One of these drives a fan which furnishes the draft for the fire and the other drives the fan which draws off the smoke through the hood. The two motors are controlled through a single switch, so that both drafts are always furnished simultaneously and there is only one operation to bother about. The blacksmith has his supply of coal in a bin out of doors, with an opening through the wall handy to the forge. This opening is closed with a slide.

Board Shows the Location of Cars

THE accompanying illustration shows a type of board that is mounted on the wall of the master mechanic's office for the New York & Harlem Railroad. This is adjacent to the master mechanic's desk and indicates the location of all cars under his supervision. The board is divided so as to indicate the various shops, and the cars are indicated by 1-in. diameter fiber tags which have the car number stamped on them. These have a small hole so that they can be hooked over small hooks on the board. These tags are also used to show other information than the car numbers. Thus, the painting of the cars is indicated by changing the color of the tags as the cars are repainted, and where cars are renumbered the old number is placed on one side of the tag and the new number on the other. Space on the board is provided so that service cars are kept separate from passenger cars. The board has glass doors and when mounted on the wall presents an attractive appearance. It is a great convenience for keeping track of the location of cars.



Board Shows Location of Rolling Stock

Roller-Link Chain Found Economical on Conveyor

MORE than seventeen years ago the Market Street Railway, San Francisco, opened a rock quarry at Daly City, one of the outlying districts reached by the system, where rock has been quarried and crushed ever since for the ballasting and paving done by this company. As first installed, the 120-ft. continuous bucket elevator used in elevating rock from the crusher pit to the top of the bunkers was operated on a malleable iron chain. The heavy duty proved too much for this type of chain and the plant was subject to frequent shut-downs while the chain was being repaired.

When breaks occurred at the top the elevator was precipitated into the pit below, and in the absence of facilities for overhead tackle the only means of reassembly was to take it apart into five-bucket sections, which one man could carry up the ladder. By this slow process the elevator was again assembled from the top down.

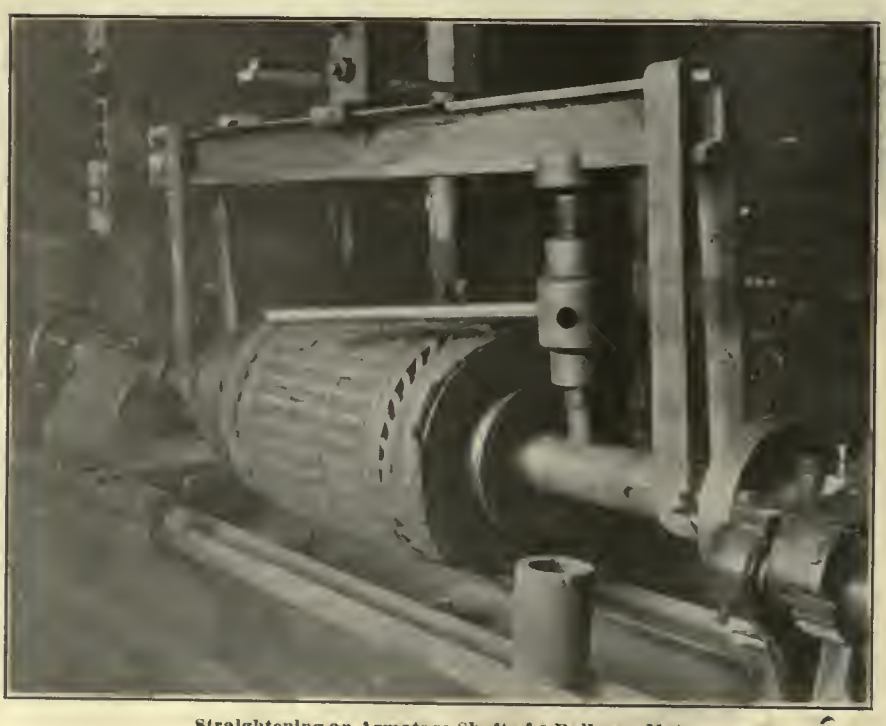
In 1906 the original chain was replaced with a steel double-link chain in which each unit consists of two links with the shaft or pin encircled by a bushing and a roller, known as a steel-thimble, roller chain. This type of chain has been in practically continuous service for sixteen years, and though the first cost was comparatively high, the advantage of avoiding delays due to breakage and the low maintenance cost have made this type of chain highly economical in the long run.

The manufacturer has long since discontinued making this particular size of chain, but replacements are readily made up in the shop of $\frac{5}{16}$ x $1\frac{1}{2}$-in. links, punched cold from strap-iron. Special pins are used with bushings and rollers cut from cold rolled tubing of two sizes. Links are made up as needed so as to keep a supply always on hand.

Straightening Bent Armature Shafts

THE armature shafts of railway motors sometimes become bent due to the breaking of pinions or to some abnormal condition. The accompanying illustration shows a rigging used by the Eighth Avenue Railroad, New York, N. Y., for straightening its armature shafts. The armature is first placed in the lathe centers and is chalked to indicate the place where the shaft is sprung. The rigging used for straightening is then attached with the armature still remaining in the lathe.

The equipment used for the straightening consists of a 60-lb. plain girder rail which extends lengthwise of the armature. Over the ends of this are placed two stirrups which pass around the end of the armature shaft. A clamping support is fastened to the middle of the plain girder rail so that the entire equipment can be suspended from a chain hoist. When the rigging has been brought up tight so as to take out all slack at the stirrups and to remove any strain from the lathe centers a screw jack with right and left hand threads is used for the straightening. A collar is placed over the armature shaft on the pinion seat or taper so that the stirrup will not slip. The jack is placed between the point where the shaft is bent and the girder rail. The jack used by the Eighth Avenue Railroad has twelve threads to the inch, and sufficient pressure to straighten the worst cases can be obtained by using a rod approximately 3 ft. long for the turning of the jack. As the most severe strains come at the pinion end of the armature shaft, this end is the one which is usually bent.



Straightening an Armature Shaft of a Railway Motor

Spot-Welded Fastenings Improve Wheelbarrow Design

REPAIR of wheelbarrows in the shops of the Market Street Railway, San Francisco, drew attention to the fact that frequent breaks were due to a weak spot in the 1-in. wrought iron pipe frame where holes are drilled for the bolts that hold the frame together. In making renewals pipe of extra heavy thickness is used and instead of drilling holes for bolts at the weak point a collar is there spot-welded onto the pipe. Thus, by eliminating four bolt holes, the resultant construction is considerably stronger and more serviceable than equipment purchased new.

On the wheelbarrow shown in the accompanying illustration only the pan and the wheel were bought for the purpose, all the other parts being made up from material previously made up from material salvaged from obsolete or worn out equipment.

Work of this sort would be economical only during slack time and with comparatively low-cost labor. However, it is pointed out that when men have been in the mechanical department long enough to earn a pension, minor work of this character fits the case very well and becomes profitable for both employer and employee.



Wheelbarrow Framework Constructed in Railway Shop

Making Thermit Compromise Welds

THERMIT compromise rail welds can be made in the track or in the shop. Where large quantities are desired of the same style, it pays to obtain special patterns and mold boxes in order to facilitate the making of the weld. Where, however, only a few are required or where various combinations are required a wax pattern can be applied directly to the rail and the mold rammed against it. The wax pattern should conform as closely as possible in shape to the aluminum pattern ordinarily supplied for rail welding and is easily shaped by hand.

A very simple and efficient way of making a wax pattern is to melt the wax in a suitable pan to a liquid stage, 1 in. thick. This is allowed to cool until the top surface has become solid. The lower part will still be plastic. This is cut into strips 2 in. wide and is applied around the rail ends.

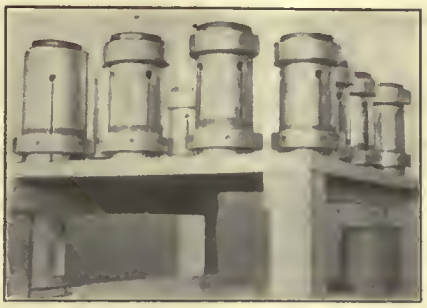
The wax will be sufficiently soft to be easily manipulated by hand to the desired shape and thickness for the weld. It is advisable to imbed a cord about ¼ in. thick in the wax, leading from the riser to the heating gate. This cord can be pulled out, leaving a vent hole, which greatly facilitates the melting of the wax during the preheating. A regular sand mold can then be rammed around the wax pattern, using wooden patterns for pouring gate, riser and heating gate.

The preheating melts out the wax and leaves the mold ready to receive the Thermit steel as soon as the rails are red hot. The rest of the operation is the same as in the case of the regular rail weld.

The quantity of Thermit required can be calculated from the weight of the wax used in the pattern. It is best to weigh the wax before starting and weigh what is left over, the difference being the amount in the pattern itself. Allow 20 lb. of Thermit rail welding mixture to each pound of wax.

Large Assortment of Self-Centering Chucks

THE accompanying illustration shows a rack with eleven self-centering chucks for holding armature bearings while they are being machined. These are used in the shops of the United Railways of St. Louis, where equipment for about 125 cars is maintained. The rack is adjacent to the lathe used for turning armature bearings and the type of chuck used is the same as described in the ELECTRIC RAILWAY JOURNAL for Jan. 20, 1923, page 129.



A Rack with Various-Sized Chucks Is Located Conveniently to the Lathe

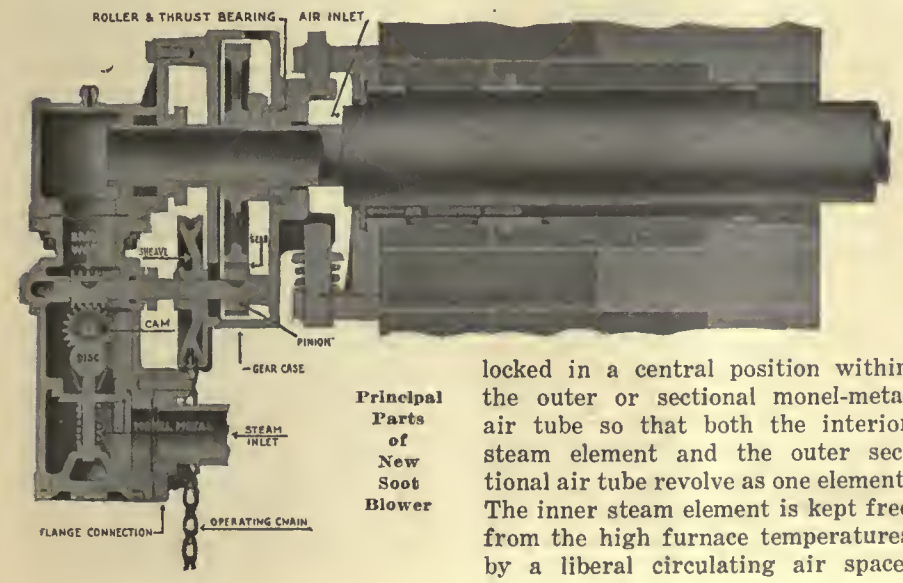
New Equipment Available

Improved Mechanical Soot Blower

IT IS common practice to overload boilers continuously and force them over high peaks during emergencies. Because of this they must not only be provided with sufficient combustion space but the boiler tubes must be kept clean. Since the furnace temperature ranges all the way from 2,000 to 2,800 deg. F. it is plain that the problem of developing a soot blower element that will stand up under this high temperature is important.

Most of the steam is generated in that portion of the boiler where heat is most intense, directly "in sight of" the fire. It is absolutely necessary that the tubes in this portion be kept free from soot. To keep these tubes clean one or more soot-blower elements must be placed close enough to reach and thoroughly clean them all. This means that these elements must be able to resist unusually high temperatures. The Bayer Company, St. Louis, Mo., has developed a revolving soot-blower element that overcomes the temperature difficulty by use of monel metal and has other valuable features.

The interior steam element is locked in a central position within the outer or sectional monel-metal air tube so that both the interior steam element and the outer sectional air tube revolve as one element. The inner steam element is kept free from the high furnace temperatures by a liberal circulating air space. Likewise, the outer monel-metal sectional air tube is kept at a comparatively low temperature by the cooling effect of the circulating air passing through and within it.



Principal Parts of New Soot Blower

Recently it was pointed out by the manufacturers of monel metal that there are eight widely used commercial metals: Copper, zinc, aluminum, iron, steel, lead, bronze and monel metal. Of these metals, acid destroys copper, zinc and aluminum; oxygen corrodes iron and steel; heat weakens lead. Monel metal resists all of these destructive forces, resists nearly all acids as well as oxidation and is able to resist hot sulphurous gases in the combustion chamber.

For these reasons, a sectional monel-metal protecting tube called an "air tube" and monel-metal nozzles are used on this new blower. The danger of oxidation of the air tube is thus eliminated and the nozzles will not corrode, nor will they wear away because of wire drawing. To take care of expansion, ample space is provided for each nozzle where it projects through the outer tube. The outer tube, also, is joined together by means of expansion sleeves to allow for expansion and contraction.

An additional feature of the Bayer blower is the valve-in-head construction. By placing the valve in the head time is saved for the operator and it automatically opens and closes at the proper points with the rotating of the element.

A cap at the bottom of the blower head gives access to the valve mechanism. This cap is easily removed and replaced. The two stuffing boxes in the blower can be readily packed without disturbing any other part and the valve is so located in the blower head that steam condensation cannot accumulate above the valve.



The elements can be rotated in either direction, which is an exclusive feature and another advantage. The steam jets are blown within a predetermined arc, making it impossible to blow except where necessary.

The entire head is free to expand or contract with change in temperature and with the expansion and contraction of the boiler walls or the pipe lines. Working parts are protected from the grit and dust of the boiler room by the head casing.

The News of the Industry

New Plan Submitted

International Railway Head Proposes Contract Providing for Operation Under Service-at-Cost

Herbert G. Tulley, president of the International Railway, Buffalo, N. Y., has submitted to Mayor Frank X. Schwab and members of the City Council an outline of a proposed city-company contract providing for a service-at-cost system on the Buffalo lines of the International. The plan would re-establish the basic 5-cent fare with free transfers, but the fare would be based upon a sliding scale, dependent upon receipts, with a 7-cent fare and a 1-cent transfer as the maximum rate.

Administration of the city-company contract would be under the direction of a transit commissioner to be appointed by the Mayor, the salary and expenses of the office to be paid by the traction company. The plan of President Tulley provides that the rate of fare would be governed by the status of a proposed fare regulation fund similar to the Cleveland plan. The fund would be $500,000. When the fund reaches $750,000 fares would be reduced, but to no lower than 5 cents, and when the fund drops to $250,000, the rate of fare would go up, but to no higher than 7 cents with a 1-cent transfer.

NINE PER CENT RETURN ASKED

The standard rate of return to the International under the proposed contract would be 9 per cent per annum. The valuation of the company would be determined with cost of additions and betterments added. All extensions would be built with city money, the company to pay the city the interest and sinking fund charges. There would be no special franchise tax and no charge for snow removal or paving to be paid by the company. It is estimated this saving to the company from the elimination of these charges would be more than $1,000,000 a year.

No part of the company's interurban revenues and no part of the interurban expenses for wages of crews or maintenance of equipment would be included under the contract. All accounts would be kept as specified by the Public Service Commission and the surplus to be credited to the proposed fare regulation fund. All deficits would be made good from the fare regulation fund. Any disagreement between the city and company under the contract would be adjusted by a board of arbitrators, one member appointed by the city and one by the company, these two choosing the third, and the expenses of such a board would be divided between the city and company.

Members of the City Council with the exception of Frank C. Perkins, Commissioner of Public Affairs and the Socialist member of the board, have refused to comment upon the plan until they have made a careful examination of all phases of the situation. Mr. Perkins, however, says that by not charging the company any paving costs, snow removal expenses and franchise tax, the International would have the best of the bargain.

Buffalo newspapers are divided in commenting editorially upon the plan. The *Commercial* says the plan is too much like the cost-plus plan in effect during the war, while other newspapers believe that much is to be gained by the city under such a contract.

Trainmen's Wages Increased in Milwaukee

An increase of 5 cents an hour in the wages of all trainmen employed by the Milwaukee Electric Railway & Light Company since May 1, 1921, went into effect on Jan. 1, 1923. The men employed since May 1, 1921, will now receive the following wages:

CITY OPERATION

Conductors	Cents
First year	45
Second year	47
Third year	49
Fourth year and thereafter	51

Motormen	Cents
First year	50
Second year	52
Third year	54
Fourth year and thereafter	56

All men will now receive time and a half for more than ten hours work.

The city trainmen, both conductors and motormen, who were in the employ of the company prior to May 1, 1921, continue to receive their former rate of wages which is 50 cents during the first year, 53 cents during the second year and 56 cents during the third year and thereafter. The majority of these men have been receiving 56 cents an hour and now are receiving that rate. The interurban men receive 2 cents an hour additional over city rates and the one-man car operators and city bus operators receive 5 cents an hour additional. In addition all men receive a bonus which varies according to the revenue, freedom from accidents, amount of power saving and a number of other factors.

The scales previously mentioned were fixed after negotiations between the company and committee of employees selected by secret ballot representing the transportation employees of the Employees' Mutual Benefit Association of the company. These negotiations are conducted semi-annually, thus permitting of frequent adjustments of wages and working conditions to meet increases or decreases in cost of living.

Plans Unification

Railroad Commission Wants Survey of Los Angeles Railway Systems to Eliminate Traffic Congestion

The California State Railroad Commission recently made an official request to the City Council of Los Angeles asking the municipal authorities to advise the commission of its desire to take part in the preliminary work looking toward a survey of the lines of the Los Angeles Railway and the Pacific Electric Railway under the contemplated plan for the unification of the two properties. The same communication was also sent by the commission to both railway companies setting forth the purpose of the proposed survey.

In the commission's activities during the past three years in its service surveys of the railway transportation problem for the city of Los Angeles it developed several months ago that the commission offered a suggested plan of the unification of the two railways.

UNIFIED OPERATION SUGGESTED

When a survey of these two lines has been completed and a valuation of the properties fixed it is expected that the commission will finally recommend one of three plans:

That the Pacific Electric Railway purchase the Los Angeles Railway lines that actually serve as "feeders" to the Pacific Electric Railway company's system of local lines in the Hollywood district of Los Angeles; that the Los Angeles Railway acquire the Hollywood lines of the Pacific Electric, or that the city of Los Angeles purchase the Hollywood lines of both companies.

The unified operation of the two railways in Los Angeles is suggested by the commission for the purpose of relieving the present traffic congestion.

The surveys of the two systems to be conducted by the commission's engineers are under agreement with the railways and in co-operation with the Board of Public Utilties. The proposed surveys by the commission are to be at the expense of the railways. The commission intends to hold a conference for the purpose of discussing these issues just as soon as an agreement of all concerned to the proposed study and survey is received by the commission.

On Feb. 10 the Board of Public Utilities held a hearing on the matter of transportation conditions in the Hollywood district and various associations from Hollywood petitioned the board to take the necessary action to better the service. Demands were made for extension of the Los Angeles Railway lines into the Hollywood district. The question was again reviewed as to who had the power to order these lines extended, as it had been previously con-

tended that only the railroad commission had such power and not the Los Angeles Board of Public Utilities. It was also urged upon the board that prompt action be taken to obtain transfers between the cars of the two railways.

HOME RULE TALK AGAIN

In the matter of fares charged, as discussed at the hearing before the board, Commissioner Kennedy of the board stated that it was the plan in the near future to circulate petitions with a view to taking out of the hands of the commission the power of fixing the rates of fare as charged on the local lines in Los Angeles. The city held this power at one time, but some years ago voted at an election an amendment to its charter placing such responsibilities and powers with the commission. Commissioner Kennedy stated that when this power is returned to the city the Board of Public Utilities would see that there is no discrimination in the fares.

The City Council plans to take immediate action regarding the survey of transportation, having referred the invitation of the commission on this matter to the Board of Public Utilities.

At various of the recent motor bus hearings and hearings on the transportation conditions in Los Angeles it was brought out by the board that the matter of unifying the two railway properties could not be taken under advisement until the proposed survey of the properties had been concluded by the Railroad Commission.

Company Will Take Further Action

Decision of the United States Circuit Court of Appeals in San Francisco recently denying a rehearing of the Puget Sound Light & Power Company's so-called specific performance suit against the city of Seattle will be opposed by the company in one more action. The suit was to compel the city to pay the bonded indebtedness of its car line—and interest—on the bonds from the general funds of the city if necessary rather than from the earnings.

J. B. Howe, attorney for Stone & Webster interests, states the company will sue for a writ of certiorari in the United States Supreme Court within the next three months. If the writ is granted the case will again come up for review.

The original action by the power company was brought in the United States District Court. Judge E. E. Cushman of that court held for the plaintiff that the city be required to meet the bonded indebtedness on its car lines from a special fund maintained for that purpose, even at the expense of the city's general fund. The city appealed to the United States Circuit Court of Appeals and the ruling of Judge Cushman was reversed. The company then appealed for a rehearing. This has now been denied in the San Francisco court.

Governor's Measure Presented

Right Would Be Conferred on Cities to Regulate Utilities in Their Boundaries

Governor Smith's own feature bill, which is supposed to embody a solution of the home rule regulation of public utilities in New York and afford a panacea for all local civic ills, is embodied in a measure introduced in the New York State Legislature on Feb. 27. This measure has been drawn in accordance with recommendations contained in the Governor's initial message to the Legislature and confers almost mandatory jurisdiction upon all cities of the State to regulate their own public utilities — mandatory that they assume such responsibility of jurisdiction, unless by a resolution of its governing board, approved by the Mayor, such city elect to have the public utilities in the city regulated by the State Public Service Commission.

The newly created bodies are to be called "city public utilities commissions." Christened with this official title, their term of office and compensation are left to the judgment of the governing board of each city, which may, if it see fit, require an existing body or officer within such city, not necessarily an appropriate body or officer, to act as such a city utilities commission.

This is the bill which has been under discussion for the past two weeks and has been all ready for introduction a couple of times, but each time has been withdrawn for repairs, once at the suggestion of corporation counsels from the up-state cities. Now it is in such shape as to be satisfactory to the larger up-state cities, especially Buffalo and Syracuse.

MUNICIPAL OWNERSHIP PROVISION INCLUDED

The notable feature of the bill is it allows local regulation of all of that portion of a utility lying wholly within a city, except that the power is reserved to the State Public Service Commission of establishing and enforcing through rates or charges for services rendered whether alone or in conjunction with any other corporation by any utility not wholly within a city; to prescribe a uniform system of accounts; to require the filing of schedules and tariffs; or to approve the issuance of stocks or bonds by all public utilities.

As the Democrats see the bill through their political spectacles absolute authority is conferred by the measure upon each city to regulate each and every public utility to the extent that the utilities operate within the boundaries of such city. A statement made by the proponents of the bill says:

> The measure gives to cities in the broadest possible sense optional home rule of public utilities, but provides if the governing board of a city does not wish to function under the law, or wishes to regulate one or more, but not all utilities within such a city, it may pass a resolution with the approval of the mayor, specifying just the kind of utilities it elects not to regulate, if any, and whatever utilities it elects not to regulate, the state commission will regulate as now provided. A city may change the regulatory jurisdiction of the utilities operated within its boundaries at any time, either from state to city or from city to state.
>
> These are the salient provisions of the bill. Other provisions provide the machinery for the transfer of jurisdiction, records and documents from the state to city commissions and their return to the state commission in the event that jurisdiction over a utility ceases to rest with the city utilities commission.
>
> The city functioning under the provisions of the proposed law is not obliged to set up an expensive additional governmental machine, but the governing board of such city may authorize any established agency of government therein, such as the corporation counsel, to exercise such prerogatives, or it may itself assume to perform the work of carrying out the provisions of the law.
>
> In the city of New York, the city public utilities commission does not have control over transit facilities or systems as in such city a special bill takes care of that subject. In all other cities the city public utilities commission has jurisdiction over service, rate of fare, facilities and everything in connection with the operation of that part of a public utility corporation within the limits of such a city, not specifically exempted and reserved to the state public service commission.

The public service committee of the Senate of the New York State Legislature will hold a hearing on the following administration public service commission bills on March 14: Senate Print No. 688, the New York City Transit bill by Mr. Walker; Senate Print No. 833 by Mr. Twomey, amending General City Law, permitting municipal ownership of public utilities; Senate Print No. 834 by Mr. Twomey, reorganizing public service commission and divesting it of certain present powers; Senate Print No. 835 by Mr. Twomey, amending Public Service Commission Law, generally.

Messrs. Emmons and McCarter to Lecture at Princeton

President C. D. Emmons and Past-President Thomas N. McCarter of the American Electric Railway Association have been appointed joint lecturers on "America's Electric Railways," under the Cyrus Fogg Brackett Foundation in Applied Engineering Technology at Princeton University during the college year 1923-1924. They will speak on the broad phases of the electric railway industry, with some reference also to the opportunities in this industry for the university trained men. This year's program of the lecture committee includes leaders in public utilities and engineering. The lecturers will include, besides Mr. Emmons and Mr. McCarter, D. D. Barnum, past-president of the American Gas Association; Alexander S. Lyman, general attorney, New York Central Railroad; J. J. Carty of the New York Telephone Company; Henry I. Harriman, August Belmont, Ralph Modjeska and C. E. Adams.

The date for the joint lecture on "America's Electric Railways" has been set for Jan. 8, 1924, at Princeton. The committee invites the American electric railway industry to contribute to Princeton such exhibits relating to the industry as the association, through its member companies, may care to have prepared and to present.

Will Consider Subway for Philadelphia

Mayor Appoints Committee of Three—Philadelphia Rapid Transit Suggests Plan

On Feb. 24 Mayor Moore of Philadelphia appointed an advisory committee of three engineers to study the various rapid transit plans that have been proposed for the city and report on the routes which, in their opinion, will best answer the present needs of the city and take care of future growth. A report is requested by April 15. The instructions of the Mayor say, in part:

> You will proceed immediately to an examination and survey of the plans of the Broad Street subway, delivery loop and other authorized high-speed lines as heretofore prepared by the Department of City Transit, to the end that on or before April 15, if possible, you will present to me, for submission to Council and the people, a report that will fully cover a comprehensive high-speed system, adequate to the present and future needs of the city, including any revision or modification thereof, or addition thereto that may be desirable.
>
> In the course of your inquiry, and with due regard to the necessities of our growing population, urban and suburban, I suggest that you set apart certain days to hear citizens, including the representatives of transit companies, who may wish to be heard with respect to existing plans or revisions or modifications thereof.
>
> You are advised that the Philadelphia Rapid Transit Company has been in conference with the Department of City Transit, in an endeavor to co-operate in the event it should become a bidder for operation of the lines when completed. You will, therefore, I trust, invite such information or suggestions as this company may have to offer, reserving, of course, the city's rights in the matter of operation should it fail to obtain an operating agreement, and remembering always that the money spent upon construction is public money, and that it is being spent primarily for the city's welfare and development.
>
> You are asked to complete your examination and survey within the limited time mentioned, so that contracts may be let and work begun upon new lines at the earliest possible date after sufficient time has elapsed for consideration by Council and the people.

The committee is composed of Dr. Milo R. Maltbie, Morris Llewellyn Cooke and Francis Lee Stuart.

Dr. Maltbie, chairman of the commission, was a member of the Public Service Commission of New York, first district, from 1907 to 1915, and has been a consultant and expert on public utilities since then. He has recently been adviser to the city of Philadelphia on its municipal gas system.

Mr. Cooke was director of the Department of Public Service of Philadelphia in 1915.

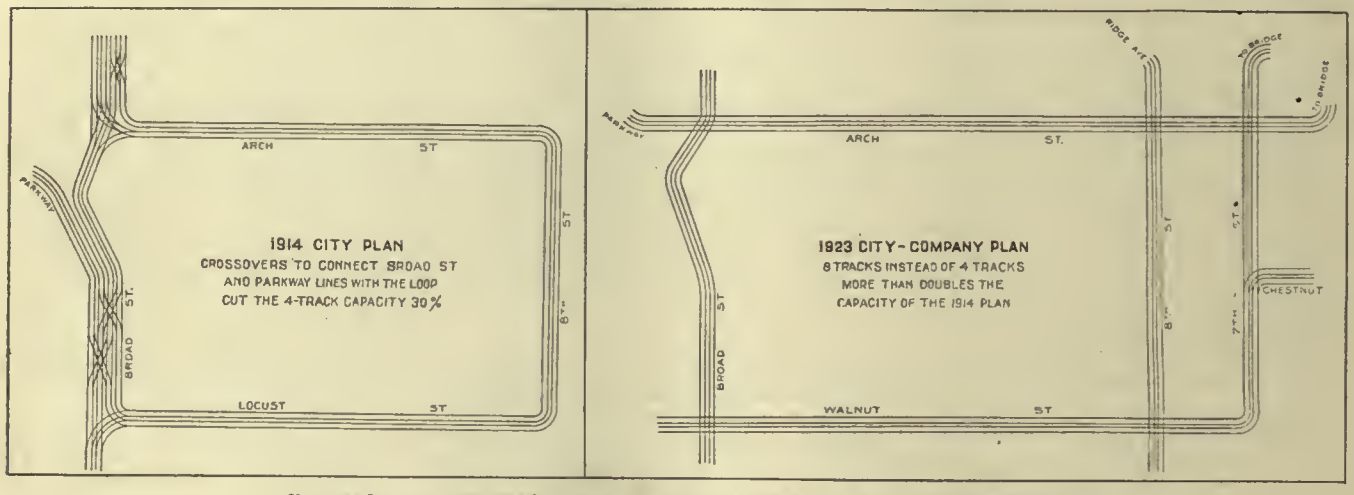
Mr. Stuart was chief engineer of the Erie Railroad from 1905 to 1910 and chief engineer of the Baltimore & Ohio from 1910 to 1915. Since then he has acted as consulting engineer on various projects, including the Port Development Commission of Baltimore and the Port Authority of New York.

It is realized by all that the increasing size of Philadelphia and the growing congestion on its narrow streets make some plan for improved rapid transit service necessary. The completion of the Frankford Elevated and its lease by the city to the Philadelphia Rapid Transit Company has given an impetus to the development of further rapid transit lines.

For many years a subway under Broad Street has been considered a necessary feature of any comprehensive rapid transit plan; such a line forming a north and south traffic artery corresponding to the present east and west rapid transit line on Market Street. A Broad Street transit plan was brought out in 1913, when A. Merritt Taylor was Transit Commissioner and recognized the fact that the Broad Street line must form the trunk of any high-speed system designed adequately to serve Philadelphia. In 1915, during Mr. Taylor's term of office as Director of the Department of City Transit, a short section of such a subway was begun under City Hall at the intersection of Market and Broad Streets. Two years later, in 1917 and 1918, short sections of subways, totaling about 900 ft. in length, were built under Arch and Locust Streets. These latter were to have been part of a "downtown loop" which Mr. Taylor proposed should form an integral part of the Broad Street subway. Due to the interference of the War Department at Washington, all subway work was suspended in 1918 and before construction is resumed the Transit Commission just appointed is to advise the city concerning some technical features of the plans heretofore adopted, the merits of which have been a matter of dispute. The plan of routing all traffic around a loop in the center of the city has been criticised by the present Director of the Department of City Transit, William S. Twining, who proposes "through-routing," as in New York City, as a substitute, with a change of plan and connections of lines to correspond.

While no arrangements have been entered into with the Philadelphia Rapid Transit Company for the operation of the proposed city-built high-speed system, that company is, of course, the logical operator, and for that reason its engineers have given a great deal of consideration to the development of practicable plans. Some of the company's recommendations appear in full-page advertisements inserted in all the Philadelphia papers of Feb. 26 and called in these announcements the "city-company" plan. The partial plan shown therein, and reproduced herewith, covers only the center of the city and is based on the principle of through routing traffic rather than concentrating it upon a loop surrounding a part of the business district of the city, similar in type to the elevated loop of Chicago. Two connections are proposed to the new bridge to be constructed over the Delaware River to Camden and to be finished in 1926. The routes recommended outside the center of the city are not indicated, but presumably are designed to fit into rapid transit lines already proposed or authorized. Some of these subway lines obviously can be used at the start for surface cars and evidently are intended to be so used, with the ultimate aim in view of removing all car tracks from the surface of some of the narrow downtown streets, as has been done on Tremont Street and other streets in Boston.

In the advertisement of the Philadelphia Rapid Transit Company already mentioned appeared an indorsement of that plan by S. M. Swaab, consulting engineer to a group of downtown retail merchants. City officials have been quoted in Philadelphia papers, however, as saying that the city was in no way officially connected with this plan.



Proposed Subway Routes in Center of City Considered in P. R. T. Advertisement

Transit Bill for Detroit

Provides Increase in Bonding for Rapid Transit Purposes—Power Plant Project Proposed

The rapid transit bill introduced in the Michigan State Legislature by Representative Culver of Detroit is expected to receive rapid action in amending the home rule act of 1909 so as to permit Detroit to vote a bond for rapid transit purposes up to 4 per cent of the city's assessed valuation in addition to the 10 per cent asked for public utilities and general public improvements. The present limit is 2 per cent for public utilities and the increase is recommended by the city officials to legalize the issuance of $5,000,000 bonds to be again voted on for street railway extensions.

Real Estate Purchase Contemplated

The primary object of the bill is stated to be that of providing a bonding limit for rapid transit apart from bonding for all other municipal purposes, opening the way for the city to finance the building of proposed subway dips and other projects.

Another provision of the bill provides for raising the present bonding limit for public utility purposes and general public improvements from 6 per cent to 10 per cent. When the rate was established the 6 per cent limit did not include the street railways as Detroit had not at that time acquired the Detroit United Railway's system or any part of it. The bill, known as the Culver-Wilcox bill, will also open the way for the city to sell real estate acquired from the Detroit United Railway and not now required in connection with the operation of the city car lines. This property is estimated to be worth between $1,000,000 and $1,500,000.

$4,000,000 for New Equipment

As the city's bonding limit has already been practically exhausted, only approximately $25,000 being available under the 2 per cent bonding limit now in effect, the increase is needed to legalize the proposed $5,000,000 issue and also to provide for the city's proposed $12,000,000 power plant, an item for which has been stricken out of this year's budget by acting Mayor Lodge. It is cited that the money for the power plant is urgently needed because the Detroit Edison Company, which furnishes the street railway department power, is now carrying its peak load, and the city could not put on any more street cars without more power being available. It has been necessary to remove the electric heaters from some of the cars in order to conserve power.

Plans have been prepared and the city has received bids on approximately $4,000,000 worth of equipment for the new power plant. The $12,000,000 bond issue is proposed for the April election, providing the amendment of the home rule act paves the way by legalizing the issue.

It is the desire of the Public Lighting Commission to progress with the new power station so as to be able to furnish service for the operation of street cars not later than July 1, 1925, by which date the cost of power service for the operation of the cars under the terms of the contract with the Detroit Edison Company will be more than $600,000 greater for the year than is paid at the present time. The net revenue of the street cars, it is cited, will be reduced in that amount plus the increased cost of additional service which will be required between the present time and July 1, 1925.

Collision on "L" in Chicago

On Sunday morning, Feb. 25, at 7:10 a.m., during the worst fog in years, a two-car North Shore Line train ran into the rear end of a three-car Evanston local elevated train, killing one passenger and injuring several. The Evanston train had made a station stop and the signal to start had just been passed when the Badger limited from Milwaukee ran into it. Service had to be suspended for two and one-half hours.

The impact broke down the platforms between the two rear cars of the Evanston local. Two passengers who were standing on these platforms were caught between the cars. One passenger was killed, the other had both legs broken. While first reports indicated that twenty-five passengers were hurt, only four were so injured that they required other than first-aid treatment.

Blame for the collision was placed on the weather condition, as the fog was in banks or clouds, the North Shore train having just entered such a bank when the trains collided.

Fifth Safety Contest On

The company's fifth safety contest was opened on Feb. 17 and will be continued until June 15, according to announcements made by the Southern Public Utilities Company. The contest will be conducted in Charlotte, Winston-Salem and Greenville, S. C., at the same time, it was stated.

The only change that has been made in the previous rules, it is reported, is that making every motorman and conductor who goes through the campaign with a clean record eligible for a prize. The prizes have been announced as follows:

To the team in each branch making the best record, $250.

To the team in each branch making the second best record, $100.

To each motorman or one-man operator who goes through the contest without an accident, $10.

To each conductor that goes through the contest without an accident, $5.

The individual prizes will be in addition to the money distributed among winners of the winning teams, it is stated. A banner is to be presented to the team making the best record in the campaign, according to announcements, and a prize is being offered for the person who writes the best slogan for the banner.

Commission Still Controls Railway

The South Carolina Railroad Commission is still supervising the railway operations of the South Carolina Gas & Electric Company at Spartanburg. There has been a falling off in traffic amounting to 15 per cent in comparison with the same average period of 1922. This decrease is apparently caused by increased unrestricted jitney competition and the very liberal use of the personally-owned automobile in daily operation.

Some weeks ago the commission took over the railway lines after the city had been without service for several weeks. The difficulty in Spartanburg dates back to December of last year when the company discontinued car service, after failure to come to an agreement with the city on the matter of bus operation. The owners of the line had advanced a plan to substitute bus operation in districts where the railway lines were unprofitable, but the city refused to agree to this.

City to Make Demands

Demands for better service, especially to the suburbs recently annexed, will be made by the city of Fort Worth of the Northern Texas Traction Company. This action will be taken by the city in lieu of further action seeking to reduce fares from 7 cents to 5 cents. The city lost its fight for reduction in fares recently when N. A. Dodge, special master in chancery held that any reduction from 7-cent fare would be confiscatory.

George H. Clifford, vice-president and general manager of the railway, declined to make any statement on the action taken by the city. He intimated that the company would await legal action to compel it to build the lines sought.

A committee of citizens has advanced a proposal that the city authorize the operation of jitneys as a measure in retaliation. Another proposal submitted is that the city take over and operate the railway.

Men Seek Wage Increase

A wage increase of 15 cents an hour for all trainmen has been asked of the Cleveland (Ohio) Railway by Division No. 268 of the Amalgamated Association. The men want the increase effective on May 1, when their present wage agreement expires. Cleveland motormen and conductors now receive 50 cents an hour for the first three months, 53 cents an hour for the next nine months and 55 cents an hour after the first year.

At the first conference between President John J. Stanley and the officers of the union, Mr. Stanley informed the men that a 15-cent increase was out of the question. Further negotiations, however, are to take place regarding the demand of the men, which also calls for changes in working conditions as well as a further wage boost.

Financial and Corporate

I. T. S. Merger Rumors

Consolidation of McKinley Utilities with So-Called Studebaker Group Said to Be Impending

For several weeks there have been rumors in the financial district of New York of a deal in which the Illinois Traction Company was to be involved. These unconfirmed statements have gone so far as to indicate a possible change in control of the company. Although the rumors have persisted, nothing definite could be learned about them at first except that they involved possible financing in the future.

Even during the war-time period the company was able to do necessary financing, mostly in the form of debentures, at very advantageous terms, and the recent unconfirmed statements indicated that the plans under discussion included the refunding of these loans for longer terms than the original borrowing.

More recently there has come from St. Louis a statement to the effect that a consolidation is contemplated of the Illinois Traction Company and the so-called Studebaker group of utilities into a $200,000,000 utility company. Attorneys for the two sets of interests are said to be conferring about the matter and the indications are that the developments have progressed to a point where a statement will be made about the matter in the near future.

At the head of the Illinois Traction is Senator W. B. McKinley. He is the chief executive officer, but for years the details of management have been in the hands of H. E. Chubbuck, vice-president executive. In addition to the McKinley money in the enterprise the company is owned largely in Canada. The stock is listed on the Montreal and Toronto exchanges and is dealt in over the counter in the United States by a few of the public utility specialists. In the past the most prolific source of new money to the company has been from the group identified with the Sun Life Insurance Company.

The Illinois Traction is a tremendous enterprise—one of the largest holding companies in the United States operating railway, light, power and gas plants in cities in the highly developed and most prosperous agricultural district of Illinois, Iowa and Kansas. Almost 600 miles of railway are included in the system. The company is a very large handler of freight.

The capital structure of the Illinois Traction consists of $7,289,500 of 6 per cent preferred stock, $12,331,000 of common stock and $4,562,000 of debentures. Of subsidiary preferred stocks there are $16,259,000 outstanding. The subsidiaries are bonded for upward of $35,000,000. The dividend on the preferred stock has been paid uninterruptedly since the organization of the company in 1904, but on the common the recent record has been 3 per cent in 1915, 1916 and 1917, and three-quarters of 1 per cent in 1918, with none since. From a low of 14 in the period between 1914-1917 the common has advanced to around 45 at the present time.

The so-called Studebaker properties are embraced in the system of the North American Light & Power Company, of which Clement Studebaker, Jr., South Bend, is chairman of the board and William A. Baehr, Chicago, president and general manager. The company was incorporated in Maine in 1915 to acquire the securities of public utility properties. It owns and controls subsidiary operating companies in the light and power field serving a population of more than 300,000 in 104 communities in Missouri, Ohio, Illinois and also in Oklahoma. The capital stock consists of $1,445,500 of preferred stock and 193,272 shares of common of a nominal value of $5. There are also outstanding $3,785,900 of first lien 6 per cent bonds, $1,600,000 of convertible series A and B bonds and $200,000 of 7 per cent notes.

San Francisco Loss $190,866

Sum Shown After Taking Out Charter Comparison Charges—Income After Expenses, Interest, Depreciation and Accident Reserves Was $55,669

THE report of the Municipal Railway, San Francisco, Cal., for the year ended June 30, 1922, has recently been made public. It was prepared for and approved by the finance committee of the Board of Supervisors. The total revenue for the year was $2,896,115, to which was added $48,475 interest on securities, making the total income $2,944,591. The total operating expenses were $2,154,566, made up as shown in the accompanying statement. The excess of income over operating expenses was $574,936, but after charging off $519,266, or 18 per cent of the gross, for depreciation there remained only $55,669 as the excess of the income over operating expenses, interest, depreciation and accident reserves. Deducting from this charter comparison charges of $246,535 there was a deficiency for the year of $190,866. This compares with a deficiency for the previous year of $188,811 and makes a total deficiency of $475,110 for the period from Dec. 28, 1912, to June 30, 1922.

The report is particularly interesting in that it takes up the various items one by one and explains them. Thus of the depreciation reserve of $1,603,572 it says that the balance to this account represents the amount of assets available for the purpose for which the fund was created and is made up by setting aside annually 18 per cent of the gross revenue. Of this amount 4 per cent was intended to provide for accident claims and the other 14 per cent was to accumulate a fund for the redemption of bonds and to meet all charges and expenses arising on account of replacements, reconstruction and depreciation. The assets available in this fund follow:

Book value of securities in the depreciation fund	$1,406,587
Cash in depreciation fund	216,235
Total assets	$1,622,822
Less outstanding warrants	19,249
Balance available	$1,603,572

STATISTICAL DATA OF THE MUNICIPAL RAILWAY, SAN FRANCISCO, FOR FISCAL YEAR ENDED JUNE 30, 1922

	Total Amount	Per Car-Mile	Per Car-Hour
Total passenger revenue	$2,884,815.20	$0.3757	$3.5558
Total operating expenses (taxes and depreciation not included)	2,154,566.46	.2806	2.6557
Total operating earnings (taxes and depreciation not included)	730,248.74	.0951	.9001
Ratio of earnings to passenger revenue	.2531		
Total taxes and charter charges	246,535.60	.0321	.3038
Ratio to passenger revenue	.0854		
Depreciation	519,266.74	.0676	.6401
Ratio to passenger revenue	.18		
Operating expenses, depreciation and taxes	2,920,368.80	.3803	3.5096
Ratio to passenger revenue	1.0123		
Net deficit from operation	3 ,55 .60	.0046	.0438
Ratio to passenger revenue	.0123		
*Passenger car mileage	7,677,307		
†Passenger car hours	811,292		
Platform expense (62½c. per hour, 8-hour day)	$1,078,160.45		
Number of passenger cars owned	198		
Number of work cars owned	1		
Total number of cars owned	199		
Total number of busses owned	8		
Total number of cars and buses owned	207		
Number of passengers carried—5-cent fares	57,189,579		
Government tickets—5-cent fares	44,057		
School tickets—2½-cent fares	818,504		
‡Revenue transfers—2-cent fares	350,642		
Free transfers	11,820,449		
Free pass (employees, etc.)	534,677		
Total passengers carried	70,757,908		
Number of passengers carried per car-mile		9.2165	

* Includes mileage of buses.
† Includes hours of buses.
‡ Transfers received at Fillmore and Union Streets treated as revenue transfers pending result of litigation.

STATEMENT OF BUS LINE OPERATIONS—MUNICIPAL RAILWAY OF SAN FRANCISCO, YEAR ENDED JUNE 30, 1922

Revenues:			
Passenger revenue		$28,564	
Quartermaster tickets—77 at 5 cents	$3.75		
School tickets—16,852 at 2½ cents	421.30		
Local transfers—394,948 at 2½ cents	3,873.70	10,298	
Total revenues			$38,863
Operating expenses:			
Repairs to buses		$13,504	
Conductors, chauffeurs—buses		18,151	
Garage expenses—buses		14,958	
Tire expense—280,127 miles at 5½ cents per mile		15,406	
Depreciation—18 per cent of receipts		5,144	
Compensation insurance		786	
Total operating expenses			67,949
Net loss			$29,086
Average net loss per day			$73

It is explained that the Municipal Railway has no capital stock and that the excess of its assets over its liabilities represents surplus. In the preparation of the balance sheet this surplus has been divided into two classes—first, that which was created by donations or contributions, and second, that which was accumulated from the earnings resulting from the operation of the road. They are listed as follows:

Contributed surplus		
Premium on funded debt	Cr.	$26,000
Represents premiums realized on sale of bonds.		
Contribution from general taxes	Cr.	$306,552
Represents the following:		
Tax moneys applied to the payment of interest on funded debt		$239,901
Cost of bond elections		29,628
Contributory services of employees		37,022
Total		$306,552
Surplus from income		
Bonds retired through income	Cr.	$1,090,900
Reserve for bond redemptions	Cr.	$99,100

These amounts represent the income, $1,190,000, which has actually been set aside in cash for the redemption of bonds. Of this amount $1,090,900 is covered by bonds redeemed and canceled, and the remainder consists of cash in the hands of the treasurer. The bond redemption program is as follows:

Name of Bond	Annual Redemption	Serial Maturity
Geary Street Railway	$95,000.00	1915–1934
Market Street Railway	6,000.00	1915–1934
Municipal Railway	100,000.00	1918–1952

For the purpose of securing a comparison between the results of the operation of municipally owned utilities and those operated by private capital, the charter of the city and county of San Francisco provides that the operating reports shall include certain comparison charges, consisting of items which constitute part of the actual cost of operating privately owned companies, but which the municipally owned utility is not required to pay. In consonance with the above-mentioned charter provision it is explained that there has been charged to the earnings of the Municipal Railway certain amounts representing insurance and taxes for the period of Dec. 28, 1912, to June 30, 1922.

The Municipal system not having to pay any of these charges, the receipts from operations were deposited in the operating cash fund without any restriction as to how they were to be used. As a matter of fact, however, most of the cash in the operating fund, represented by such comparison charges, was actually expended in new construction and addition and betterment work, so that these reserves, representing obligating charter comparison charges, have in reality been used as reserves for betterments.

For the purpose of making the balance sheet reflect the actual results of operating, the amount expended in addition and betterment work has been reflected in an account entitled "Additions and Betterments From Income," and the charter reserves for insurance and taxes carry a balance equal only to the unused portion of the original reserves.

The account of $1,431,800 for additions and betterments from income represents the value of construction and addition and betterment work performed out of the funds derived from the operations of the road. A small portion of the cash used in this connection came from the depreciation fund, but the larger portion consists of operating fund moneys.

Operating surplus of $211,407 represents the following:

Surplus June 30, 1921, as per last report		Cr. $26,761
Add: Deduction of compensation insurance reserve corresponding to dividends declared by the state compensation insurance fund adjustment	$96,172	
Less: Transfers previously made by operating fund	90,000	6,172
		$27,934
Deduct:		
Amount transferred from income account	*$190,866*	
Interest on bonds owned credited to income but deposited in the depreciation fund	*48,475*	*239,341*
Balance		*211,407*

The total surplus of $2,905,373 derived from the operation of the road, all of which has been referred to in detail above, is as follows:

Bonds retired through income	$1,090,900
Reserve for bond redemption	99,100
Advanced general fund account Twin Peaks tunnel	82,152
Advanced general fund account Stockton Street tunnel	48,971
Charter reserves	363,856
Additions and betterments from income	1,431,800
Operating surplus	*211,407*
Total	$2,905,373

Italics indicate loss or deficiency.

COMPARATIVE INCOME ACCOUNT OF SAN FRANCISCO MUNICIPAL RAILWAY FOR PERIOD, FROM DEC. 28, 1912, TO JUNE 30, 1922

	Period 12/28/12 to 6/30/21	Period 7/1/20 to 6/30/21	Period 7/1/21 to 6/30/22	Period 12/28/12 to 6/30/22
Passenger revenue	$16,363,363	$2,868,616	$2,884,815	$19,248,178
Miscellaneous revenue	71,331	10,468	11,300	82,632
Total revenue	$16,434,694	$2,879,084	$2,896,116	$19,330,810
Interest on securities owned	166,383	35,128	48,476	214,858
Total income	$16,601,077	$2,914,212	$2,944,591	$19,545,668
Operating Expenses				
Ways and structures	$462,249	$100,228	$112,630	$574,880
Equipment	874,929	201,109	216,317	1,091,244
Power	2,095,983	401,861	383,139	2,479,119
Conducting transportation	6,780,080	1,315,475	1,324,926	8,105,007
Traffic	3,632	994	79	3,714
General and miscellaneous	499,661	89,124	117,475	617,136
Loss on road retired	8,184	8,184	.....	8,184
Total operating expenses	$10,724,718	$2,116,975	$2,154,566	$12,879,284
Excess of income over operating expenses	$5,876,359	$797,237	$790,025	$6,666,384
Less interest on funded debt	1,757,927	224,453	215,089	1,973,016
Excess of income over operating expenses and interest	$4,118,432	$572,784	$574,936	$4,693,368
Less reserve for depreciation and accidents (18% of gross earnings)	2,944,507	516,415	519,267	3,463,774
Excess of income over operating expenses, interest and depreciation and accident reserves	$1,173,925	$56,369	$55,669	$1,229,594
Less charter comparison charges	1,440,167	245,180	246,535	1,686,704
Net income	*$266,245*	*$188,811*	*$190,866*	*$457,110*
Analysis of comparison charges:				
*State franchise tax, 5½% of gross earnings	$861,298	$151,152	$152,038	$1,013,336
Municipal franchise tax, 3% of gross earnings	490,934	86,069	86,545	577,478
Municipal car license	21,318	2,985	2,970	24,288
Federal income tax	13,270	.....	.....	13,272
Salary of clerks	4,872	.....	.....	4,872
Law expense	13,500	.....	.....	13,500
Insurance	34,975	4,974	4,982	39,957
Total	$1,440,167	$245,180	$246,535	$1,686,703

Italics indicate loss or deficiency.
* Franchise tax percentage has varied in different years.

The comparative income statement for the period from Dec. 28, 1912, to June 30, 1922, presents in summary form an analysis of the income and expenses of the road from the date operations commenced, Dec. 28, 1912, to June 30, 1922; also a comparison between the fiscal years ending June 30, 1922, and June 30, 1921, and an analysis of the charter comparison charges. For the purpose of showing clearly just what the property has earned, the direct

operating expenses have been deducted from gross income, and from the resultant figures there has been deducted in turn interest on funded debt, reserve for depreciation, and charter comparison charges, a new total being shown after each deduction.

MILEAGE—MUNICIPAL RAILWAY SAN FRANCISCO, SINGLE TRACK—JUNE 30, 1922

Operated track:	
Track owned and operated June 30, 1922	57.97
Track owned and operated jointly with the Market Street Railway	5.15
Total operated track	63.12
Non-operated track, sidings, turn-outs, etc.:	
Masonic Avenue spur	.46
Polk and Geary Streets spur	.05
Columbus Avenue, between Washington and Jackson Streets	.08
Geary Street carhouse sidings and turn-outs	2.18
Seventeenth Street carhouse, sidings and turn-outs	1.23
	4.00
Total single track mileage June 30, 1922	67.12
Track changes made during year ended June 30, 1922	None

Financial Readjustment Approved

Readjustment of the financial structure of the Chicago, North Shore & Milwaukee Railroad so as to give greater elasticity to finance and permit capital expenditures such as will enable the company to accept the continuous new business offered it, as recommended recently by the board of directors, was ratified at the annual meeting of participation shareholders held on Feb. 27. The reorganization plan provides for:

1. The creation of an open first and refunding mortgage under which bonds may be issued for retiring first mortgage bonds and other obligations issued for capital expenditures now outstanding and for capital expenditures in the future.
2. The issuance of $10,000,000 prior lien 7 per cent stock to be sold as required for capital expenditures and to retire equipment notes and secured notes in accordance with the sinking fund provisions governing these issues.
3. The issuance of 50,000 shares of 6 per cent non-cumulative preferred stock of $100 per share par value, and 50,000 shares of common stock, $100 par value. This $10,000,000 of preferred and common stock is to be given to the participation shareholders in exchange for their 170,000 no-par participation shares in the ratio of 50 per cent thereof to the holders of the first preferred participation shares, 40 per cent to holders of second preferred participation shares and 10 per cent to holders of common participation shares. Provision for this is made in the participation trust agreement.

It is the intention to give recognition to the dividends in favor of the first and second preferred participation shares. These unpaid dividends, on Dec. 31, 1922, amounted to approximately $2,700,000. In recognizing these dividends it is proposed to give the shareholders the unsecured non-interest bearing notes of the new corporation, payable five years after date, the new corporation at the maturity of the notes to have the option of either giving new notes bearing interest and payable in five years, or of exchanging them for the company's 6 per cent non-cumulative preferred stock at par, or to pay the notes in cash. The shareholders authorized the trustees to proceed with the sale of the property and the issuance of the securities.

Charles C. Shedd was elected a director to succeed E. A. Shedd, deceased. John R. Thompson was re-elected.

$504,979 Net in Louisville

Preferred Dividend Payments Being Arranged—Common Dividend Prospects Very Good

At the annual meeting of the stockholders of the Louisville Railway on Feb. 21, President James P. Barnes announced that arrangements were being made to resume paying dividends on the preferred stock about April 1. The possibility also exists of resumption of dividend payments on common stock by 1925. The voting of dividends on the preferred stock will mark the first dividend paid in a period of five years by this company. This dividend has not been determined as yet and must come out of net earnings since the first of the year, according to Mr. Barnes in a talk after the meeting.

The company has a fund of $504,979 on hand, listed as a balance from 1922, available for dividends on stock, but Mr. Barnes explained that under the terms of the present franchise contract with the city, this money will have to be spent to improve service.

All directors and officials of the company were re-elected.

The comparative income statement of the company for 1922 showed total operating revenues of $4,542,817, an increase of $73,315; operating expenses of $3,190,232, a decrease of $83,490; net revenue from operations, $1,352,585, an increase of $156,805; gross income of $1,128,380, an increase of $198,838. Deductions from the last item are as follows: Interest on bonds and notes $619,589, a decrease of $13,490; amortization of discount on notes $2,220, a decrease of $2,882, and miscellaneous debits of $1,590, an increase of $825, giving total deductions of $623,400, a decrease of $15,547.

COMPARATIVE INCOME STATEMENT OF THE LOUISVILLE RAILWAY

	1922	1921
Revenue from transportation	$4,358,450	$4,275,435
Other operating revenues	184,367	194,067
Total operating revenues	$4,542,817	$4,469,502
Operating expenses	3,190,232	3,273,723
Net revenue from operations	$1,352,585	$1,195,779
Taxes	388,000	363,000
Operating income	$964,585	$832,779
Non-operating income:		
Louisville & Interurban Railroad Co., net income	$145,982	$87,885
Other non-operating income	17,813	8,877
Total non-operating income	$163,795	$96,762
Gross income	$1,128,380	$929,541
Deductions from gross income:		
Interest on bonds and notes	$619,589	$633,079
Amortization of discount on notes	2,220	5,103
Miscellaneous debits	1,591	766
Total deductions	$623,400	$638,948
Balance available for dividends on stock	$504,979	$290,592

The first matter touched upon by Mr. Barnes in his remarks to the stockholders was the fare case. The various moves made in this connection he reviewed very briefly. All of these steps were followed from time to time in the ELECTRIC RAILWAY JOURNAL from the hearing before the Court of Appeals at its March term in 1922 to the passage on Aug. 24 of the new franchise ordinance by the Board of Aldermen. This grant the stockholders of the company approved on Sept. 11 and at 4 a.m. Sept. 17 the ordinance became effective, placing in effect a 7-cent cash fare with tokens at the rate of five for 30 cents.

It was explained by Mr. Barnes that on July 16 one-man safety cars were placed in operation on the Brook Street line. These cars were rebuilt in the company's own shops. The economies resulting from the operation of these cars make it possible to improve the service by running additional cars at closer headway, and their adaptability is recognized in the new fare ordinance, to which reference has just been made, which contains as one of its provisions a paragraph directing the acquisition of 80 additional cars of this type. Fifty-five new safety cars have been ordered from the J. G. Brill Company, some of which are already in operation on the Chestnut Street line, and a sufficient number of old cars have been remodeled in our own shops to complete the number required by ordinance.

When this program is completed the company will have available for operation 101 safety cars. The economies from the use of the new cars, with the saving in platform expense, reduction in power cost, etc., result in an estimated saving of approximately $100,000 a year.

In 1920 seventeen lives were lost in street car accidents in Louisville, in 1921 seven lives and in 1922 three lives. This is regarded as a graphic and very gratifying illustration of the effectiveness of the safety work, in which the officers of the company have been greatly assisted by the Louisville Safety Council.

Mr. Barnes explains that on Dec. 18 the transportation committee of the Welfare Association met the officers of the company and after a general discussion of wage scales in this and other industries a new scale was arranged for platform employees to be effective Jan. 1, 1923. Under the new scale, rates paid to motormen and conductors are as follows:

Period	Rate per Hour
First three months	$0.34
Next nine months	.37
After one year	.40
After two years	.45

One cent an hour additional is paid for interurban service and 3 cents an hour additional for safety car operators.

Purchases Plant.—The Potomac Public Service Company, operating in Maryland, Pennsylvania, Virginia and West Virginia, has purchased the plant of the Fayetteville Electric Light & Power Company and will take possession June 1.

Valuation of Los Angeles Properties Proposed

In connection with plans announced by the California State Railroad Commission for the proposed unification of the lines of the Los Angeles Railway and the Pacific Electric Railway, the City Council on Feb. 21 adopted the report of the commission, passing the necessary motion in the Council ordering a survey of the two properties in question with a view of their consolidation into a single transportation system.

Engineers of the two railways, working under the supervision of the State Railroad Commission and the Los Angeles City Board of Public Utilities, will make a survey determining the price the Pacific Electric Lines should pay for the Los Angeles Railway system, the price the Los Angeles Railway should pay for portions of the Pacific Electric's local street car system in the city and the amount to be paid by the city of Los Angeles for both city systems should the city elect to take the systems over and operate them. Richard Sachse, formerly chief engineer of the State Railroad Commission, has been engaged to fix the valuation of the properties.

No estimate is given of the time required to complete the survey, but it is thought from three to six months will be necessary in order to compile an exact valuation cost for the Los Angeles Railway properties, as it has been nine years since a proper value was affixed on the property. However, the conditions are somewhat better in connection with the Pacific Electric Railway properties, as that company recently completed a valuation of its properties started during the year 1912 upon order of the State Railroad Commission. These completed valuation data were used extensively during the past two years in rate increase hearings held before the commission.

Bond Issue Approved Conditionally

A bond issue for $500,000 of the Cincinnati Rapid Transit Commission was signed recently by Mayor George P. Carrel on condition that no further contracts would be entered into by the commission until negotiations between the Cincinnati (Ohio) Traction Company and the Cincinnati Street Railway looking to an adjustment of the traction problem in Cincinnati are concluded.

Mayor Carrel refused to sign the bond issue in November, giving as his reason then—immediately after the failure of the extra city tax levy to pass—that no additional financial burdens should be placed on the voters, since they had expressed at the election their desire that the city should function on decreased income.

The proceeds from the sale of the bonds will be employed to pay off existing contractual obligations, to compromise lawsuits and in purchasing property for the completion of the rapid transit system.

The commission informed the Mayor that it needs between $100,000 and $200,000 to compromise claims now in litigation against it by reason of landslides along the subway system.

January Boston Net $96,725

The Boston (Mass.) Elevated Railway still owes $3,462,955 to fourteen cities and towns which advanced money by taxation to pay its deficit from operation during a lean period ending in 1919. The company has accumulated $465,929 toward its second payment on that indebtedness. That payment will be made next July. The company hopes to be able to pay $1,000,000. At the present rate the entire indebtedness should be wiped out in three or four years, after which the company will be in a position to make a downward revision of its fare unit, now 10 cents.

So long as the company continues to make financial gains month by month it probably can reduce fares gradually by the introduction of more 5-cent routes, which are not considered as a part of the straight rate fabric. These 5-cent routes are intended to encourage short-haul riding where they do not encroach upon the 10-cent routes, or eat materially into the receipts from the 10-cent fares, and they bring down the average charge per fare, but the regular 10-cent fare cannot under the present law be reduced until the company has paid its debt to the cities and towns that were assessed in 1919 to pay its deficit from operation.

Even Mayor Curley of Boston has officially announced abandonment of his 5-cent fare campaign, in the face of this law which has been interpreted to him by his own law department, as well as by the State Attorney-General.

In January the Boston Elevated earned $96,725 in excess of the cost of service, while in 1922 the company earned $203,273 in excess of the cost of service. The expenses for January, 1923, however, included $190,807 cost of removal of snow. The condensed statement for January follows:

	1923	1922
Receipts from direct operation	$2,982,532	$2,802,683
Interest on deposits, income from securities, etc.	15,764	34,373
	$2,998,297	$2,837,057
Cost of service	2,901,572	2,633,783
Excess of receipts over cost of service	$96,725	$203,273

The report is interesting in that it shows 25,016,707 10-cent passengers carried in January, 1923, as compared with 24,747,377 in January, 1922, and 8,351,759 5-cent passengers in January, 1923, compared with 5,449,332 5-cent passengers in January, 1922. The receipts per revenue passenger in January, 1923, were 8.985 cents compared with 9.395 cents in January, 1922. The average cost per ton of coal consumed in January, 1923, was $7.68, compared with $6.90 in January, 1922. Coal costs for the two months were: January, 1923, $233,014; January, 1922, $194,388.

Auction Sales in New York.—At the public auction rooms in New York there were no sales of electric railway securities this week.

Will Issue $1,000,000 in Bonds.—The new Lima-Toledo Railroad, which is to take over the property of the old Ohio Electric Railroad, between Toledo and Lima, recently bid in by the bondholders, will issue $1,000,000 in bonds and acquire some new capital by the issuance of $750,000 in preferred stock and $1,000,000 in common stock.

$2,500,000 East Penn Issue.—A new issue of $2,500,000 East Penn Electric Company first mortgage and refunding lien 6 per cent gold bonds, due 1953, is being offered at 97 and interest, to yield over 6.20 per cent. The syndicate offering the bonds consists of J. G. White Company, Spencer Trask & Company, Marshall Field, Globe, Ward & Company. The bankers state that the company supplies most of Schuylkill County, Pa., with electric light, power and railway service.

Mortgage Gold Bonds for Sale.—Arthur Perry & Company and Paine, Webber & Company, New York, are offering $750,000 of the Indiana Service Corporation, Fort Wayne, Ind., first and refunding mortgage 5 per cent gold bonds, series A. The price is 88¼ and interest yielding 5¾ per cent. The bonds are dated Jan. 1, 1920, and are due Jan. 1, 1950. Upon completion of the present financing it is estimated that the total funded debt outstanding in the hands of the public exclusive of income bonds will amount to less than 47 per cent of the valuation of the company's property.

Initial Common Dividend by Federal Light & Traction.—At a special meeting of the board of directors of Federal Light & Traction Company, New York, N. Y., held Feb. 21, 1923, an initial quarterly cash dividend, at the rate of 75 cents per share, was declared upon the common stock of the company. An extra dividend of 75 cents per share was also declared upon the common stock of the company payable in 6 per cent cumulative preferred stock of the company. Both dividends are payable on April 2, 1923, to common stockholders of record at the close of business on March 15, 1923.

$10,000,000 Philadelphia Company Issue.—A new issue of $10,000,000 Philadelphia Company fifteen-year 5½ per cent convertible debenture gold bonds, dated March 1, 1923, and due March 1, 1938, is being offered at 92½ and accrued interest to yield over 6¼ per cent. The Philadelphia Company's assets consist of investments in gas and oil properties valued at more than $76,000,000 and investments in electric light and power companies valued at $29,000,000 above existing indebtedness. It also owns securities of the Pittsburgh Railways representing the equity in the electric railway system in Pittsburgh and vicinity. The present issue will be convertible at the holder's option on or after March 1, 1924, par for par, into non-callable 6 per cent cumulative preferred stock.

Traffic and Transportation

Rhode Island Commission Has Approved Short-Haul Bus Plan

The substitution of motor bus service for local electric railway service along Broadway, placing all electrics on an express line basis, was authorized on Feb. 23 in an order entered by the Public Utilities Commission of Rhode Island granting such a request of the United Electric Railways. As was explained at considerable length in the ELECTRIC RAILWAY JOURNAL for Feb. 17, page 301, a bus line will operate between Exchange Place and Barton Street, and the electric cars operating over Broadway will run express between La Salle Square and Broadway and Valley Street, in both directions. The outbound cars will stop to take on passengers at all of the present stops, and the inbound cars will make the customary stops to discharge passengers. All cars over Broadway, under the new plan, will be operated under the same plan as the Hughesdale and Centredale cars are now running, and the proposed bus line will provide the local service for patrons between Barton Street and La Salle Square.

Charter Permits Bus and Trackless Trolley Operation

The first move by up-state traction companies to start operation of trackless trolleys was made on Feb. 24 by the New York State Railways in the incorporation of the Rochester Railways Co-ordinated Bus Lines, Inc.

The directors of the Rochester corporation are James F. Hamilton, president of the New York State Railways, and W. A. Matson and Daniel M. Beach, Rochester, officials of the New York State Railways.

Under the terms of the charter granted to the new corporation, which is incorporated for $50,000, stage or omnibus routes may be operated. It is probable that the corporation will operate both buses and trackless trolleys. As has been noted previously in the ELECTRIC RAILWAY JOURNAL the new corporation intends to operate connecting cross-town lines between the trolley lines in Rochester.

Cleveland Fare Down to Five Cents

Fares in Cleveland were reduced by the Cleveland (Ohio) Railway to 5 cents cash, eleven tickets for 50 cents and 1 cent for transfer without rebate, on March 1. The fact that a decrease in fare was impending was announced in the ELECTRIC RAILWAY JOURNAL some time ago. Posters announcing the fare reduction were put in all Cleveland cars by the company on Feb. 27, following President John J. Stanley's notification to the City Council on Feb. 26.

The fare reduction comes in accordance with the franchise amendment which provides that when the interest fund, the fare barometer, contains in excess of $700,000, the rate of fare shall be automatically decreased.

Feb. 28 is the end of the company's ordinance year and on that date any surplus in the company's funds, such as the operating or maintenance fund, is placed to the credit of the interest fund. On Feb. 1 there was a surplus in the company's funds of $488,008. On the same day the interest fund contained $474,848. Mr. Stanley, in his letter to the City Council, said that the company's operating allowance for February would be exceeded, but in spite of this draft upon the surplus of the company's funds on Feb. 1 there would still be enough money to throw into the interest fund on Feb. 28 to make the interest fund exceed the $700,000, when the fare reduction takes place.

Council Approves Additional Bus Lines

The City Council at Toledo, Ohio, has finally approved the addition of two auxiliary bus lines for the Community Traction Company and directed that purchases of the buses be made from the moneys in the depreciation fund of the car company as set up by the Milner ordinance. Commissioner Wilfred E. Cann had combated this theory of the payment for the new bus equipment, but he was overruled by the Council.

The new lines will be on Oak Street from Fassett to the end of the street and on South Erie Street, where the present tripper service in effect will be supplanted by one bus.

No date has been set for the starting of the new auxiliary service and company officials have not made any announcement as to the type of bus to be purchased. It was considered at one time that the equipment would probably be the Garford bus, with seating capacity of about twenty-five passengers. Garages and shops will be constructed to take care of the buses.

5-Cent Agitation Continued in Washington

Tennessee Senator Wants Special Committee to Report on Railway Methods—Capital Traction Official Does Not Believe Congress Wants to Throttle His Company Financially

SENATOR McKELLAR of Tennessee, as a continuation of his efforts to secure a return to a 5-cent cash fare on the railways of Washington, introduced a resolution on Feb. 27 calling for the appointment of a special committee of the Senate to investigate the entire question and report at the next session of Congress.

It is understood that the committee to be named under this resolution, if adopted, will be composed of Senator Ball of Delaware, Senator Couzens of Michigan, Senator Keyes of New Hampshire, Senator Simmons of North Carolina and Senator McKellar.

The resolution proposes an inquiry into the franchise grants between the railways and the District of Columbia regarding rates of fare, and especially into the authority of the District of Columbia Public Utilites Commission to order increases of fares. The cash fare in Washington is 8 cents, with six tokens for 40 cents. Senator McKellar has been waging war against railway fares in Washington for several weeks, having spoken on the subject frequently on the floor of the Senate. He has also attacked the members of the District Public Utilities Commission, alleging that they acted without authority in granting increased fares and that such increases violated contracts between the companies and the District. In this connection, it has been pointed out that during the political campaign in Tennessee last fall, when Senator McKellar was re-elected, the successful candidate for Governor on the same ticket, and others, assailed the Tennessee Public Utilities Commission. Also, there is a politico-economic controversy ranging around the railway system in Memphis, the Senator's home city.

The Tennessee Senator offered amendments directing a return to 5-cent fares to three District of Columbia bills in the Senate recently. On the last occasion his amendment was laid on the table by a narrow vote of thirty-seven to thirty-six.

J. H. Hanna, vice-president of the Capital Traction Company, Washington, D. C., on Feb. 20 wrote to Senator McKellar calling his attention to certain statements made by him on Feb. 17 in debate on the 5-cent fare amendment relating to the Capital Traction Company and the effect which the proposed rate of fare would have on it. This letter was sent with a view of giving Senator McKellar accurate information respecting certain matters on which he had been misinformed.

In view of the position of Senator L. Heisler Hall as chairman of the Senate district committee, and knowing Mr. Hall's interest in all affairs concerning the District of Columbia, Mr. Hanna sent him a copy of the letter to Senator McKellar and also gave him certain more detailed information respecting the situation.

The comparison made by Mr. Hanna is shown between the years 1922 and 1912 because in the discussion of the proposed amendment reference was made to conditions existing ten years ago, and also because the year 1912, probably as fairly as any of the pre-war years, reflects conditions existing under the 5-cent fare, with six

tickets for 25 cents. Data submitted by Mr. Hanna show that:

Total operating revenues in the year 1922 were 120.4 per cent greater than in 1912.

Operating expenses and taxes in 1922 were 193.0 per cent greater than in 1912.

Operating income available for interest, dividends and improvements to property was 34.3 per cent greater in 1922 than in 1912.

Pay passengers increased 34.6 per cent in 1922 over the year 1912.

In 1922 this company earned 8.6 per cent on the fair value of its property as fixed by the Public Utilities Commission, and paid a 7 per cent dividend to its stockholders. During the past ten years it has paid dividends to stockholders ranging from 5 per cent to 7 per cent per annum, the average being 5.975 per cent.

During 1922 operating expenses and taxes per pay passenger was 5.083 cents. Interest and dividends required a further 1.637 cents. At the present rate the average fare per pay passenger is 6.962 cents.

Trainmen's wages constitute a very large item of operating expense. In 1912 the total wages paid the trainmen was $460,070, and in 1922 $1,272,399, an increase of 176.6 per cent. In 1912 the average wage paid trainmen was approximately 23.72 cents an hour and in 1922 55.62 cents. The wages of other employees were increased in about the same ratio during this period, in order to adjust wages to living costs.

Mr. Hanna says that re-establishment of the pre-war fare of 5 cents cash with six tickets for 25 cents would reduce income to a point where the company could not meet operating expenses and taxes, unless the wages paid to employees were materially decreased. Restoration of the old rates would simply make it impossible for the company to meet interest charges or pay any dividend. It is Mr. Hanna's idea that Congress has no desire to place the company in a position where it would be forced to reduce wages, default on interest charges and suspend all dividends, as would be necessary under the restoration of the 5-cent cash fare.

Mr. Hanna calls attention particularly to the fact that any discussion of the capitalization of the company has no bearing on the present fare situation. The values of both railway companies operating in the District have been found by the Public Utilities Commission, and existing rates of fare were fixed by it on the basis of those values. Reports for the year 1922 show that the amount earned under the existing rates of fare on the combined fair value of the two companies as found by the commission was less than 6 per cent, and that the proposed rate of fare would, if made effective, entirely eliminate any question of values or rates thereon, as the income would not be sufficient to meet operating expenses. In conclusion Mr. Hanna said his company was ready at all times to furnish any information that Congress might desire respecting the operations of his company.

Six-Cent Fare Again Extended.—The City Council of Richmond, Va., recently extended the 6-cent fare ordinance under which the Virginia Railway & Power Company is relieved of its obligation under franchise to carry passengers at a fare of 5 cents. The Mayor signed the paper, giving the company permission to charge 6 cents for six months more. The ordinance has been extended regularly every six months for the last two years, awaiting settlement of the new franchise.

Traffic Congestion Worries Newark

Change in Public Opinion Results in a Demand for Removal of Jitneys from Trolley Streets

A short time ago the *Sunday Call*, Newark, N. J., carried under the caption "Newark Needs Your Help" an appeal to its readers to write to the paper telling their views on ways to reduce traffic congestion in the center of the city. By this action the newspaper took the initiative in directing public attention to an important civic problem that has been constantly becoming more complex. Many letters were received in answer to the appeal showing that many people had given serious study to the question, and quite remarkably, had nearly all arrived at the same conclusion, namely, that the jitney buses should not be allowed to operate on the same street with the trolleys.

Conditions Becoming Unbearable

The original announcement about the matter, which appeared on Feb. 18, 1923, said in part:

Business in the central district of Newark will be seriously threatened, if certain conditions are not corrected soon. Traffic complexities, with attendant discouragement to out-of-town buyers, due to overburdened main thoroughfares and parking difficulties, are much discussed.

Several groups of Newarkers are studying conditions, but they and all others interested in the welfare of the city court advice and criticism. How can these problems be quickly and wisely solved? What do you think is the basic cause?

Let us have your opinion, your analysis of the whole situation, your suggestion for relief.

On Feb. 25 the paper published several pages of letters received in answer to the appeal. Well considered thought characterized almost all of the replies. Only one writer showed that he was unable to distinguish between healthy business activity and hopeless traffic congestion. A few others offered rather far-fetched solutions of the difficulty suggesting overhead bridges for pedestrians, huge underground garages beneath the public parks and so forth.

Subway construction was suggested also as a measure of relief, although none of the proponents of this plan offered any definite ideas to show how it could be arranged. Various other remedies found a little support among the writers of the numerous letters. The New Jersey Industrial Traffic League contributed a novel idea by urging the establishment of a trolley freight service to reduce the amount of heavy trucking in the city streets.

Most of the answers published by the *Call*, however, agreed in putting the blame for the existing traffic congestion on automobile parking and on duplication of transportation facilities on streets where both buses and cars are operated. Inasmuch as no two people thought alike about the proper way to restrict parking, the result was not particularly informative. Opinion was almost unanimous, however, that the first step to relieve traffic congestion in Newark must be to remove jitney bus routes from the important streets on which trolleys operate in the center of the city. This very suggestion had been put forward before from time to time during the past several years by those who had studied the transportation problem but it had always met with a storm of protest from those who wished to have the buses on the principal streets. Storekeepers also had voiced a determined opposition when it was proposed to take the jitneys away from their front doors. It appears now that sentiment is beginning to swing the other way. The practical unanimity of the letter writers in urging this step shows that the public is beginning to realize the disadvantage in having duplicate transportation facilities on the same crowded streets, and the improvement to be effected by removal of bus routes to streets where there are no trolleys.

Average of 4,524 Passes a Week for First Year in Fort Wayne

The first year of the use of the weekly pass system by the Indiana Service Corporation on the Fort Wayne city lines ended Feb. 27. The records of sales show that a total of 235,254 weekly passes were sold during the year, making an average of 4,524 passes a week for the fifty-two weeks.

Starting in with a modest sale of only 2,967 the first week, the sales increased steadily until the peak was reached recently with sales of 7,539 passes. February, with its cold weather and many snows, was an exceptionally good month for pass sales, each week the number sold amounting to more than 7,000. The previous high mark was reached in the week before Christmas when 7,162 were sold.

It is estimated by company officials that the average use of each pass is twenty-five rides. As the pass sells for $1, this means a 4-cent fare for the steady rider.

Five-Cent Fare Bill Killed.—The Massachusetts House of Representatives on Feb. 20 voted to uphold the report of the rules committee in refusing to admit the petition of Mayor James M. Curley of Boston for a 5-cent fare and public operation of the electric railways.

Magnanimous Bus Company.—The Port Jervis (N. Y.) Traction Company in the emergency of snow-clogged tracks has been operating a bus between Sparrowbush and Tri States. The Hudson Transit Company loaned the railway company a bus to help solve the transportation difficulty.

One-Man Cars, Lower Fare, More Service.—One-man operation with the Birney type car was started on Sunday, Feb. 18, on its city line in Milwaukee by the Chicago, North Shore & Milwaukee Railroad. At the same time the company reduced it rate of fare on the line from 6 cents to 5 cents and increased the frequency of service from a headway of ten minutes to a headway of six minutes.

Personal Items

Mr. Rossman at Mobile

Westinghouse Division Manager Becomes Railway Vice-President and General Manager

Frank F. Rossman has resigned as division manager of the Westinghouse Electric & Manufacturing Company at Kansas City, to become vice-president and general manager of the Mobile Light & Railroad Company, Mobile, Ala., the duties of which office he assumed on March 1. Friends of Mr. Rossman tendered a dinner in his honor at the Hotel Baltimore, Kansas City, on Feb. 22. Brief talks were made by



F. F. Rossman

W. M. Hand, district manager of the General Electric Company; C. E. Allen, southwestern district manager of the Westinghouse Electric & Manufacturing Company; Col. K. D. Klemm, president of the Kansas City, Kaw Valley & Western Railway; Col. P. J. Kealy, former president of the Kansas City Railways; B. C. Adams, vice-president and general manager of the St. Joseph Railway, Light, Heat & Power Company; Mayor H. B. Burton of Kansas City, Kan.; L. H. Chapman commissioner of water and light, Kansas City, Kan.; D. O. Vaughn, vice-president of the Albert Emanuel Company. F. G. Buffe, general manager for the receivers of the Kansas City Railways, presided as toastmaster.

Mr. Rossman has represented his company in the Kansas City territory for the last eight years, and in that time has endeared himself to all those in the industry with whom he has come in contact. Mr. Rossman has completed his twenty-third year of service with the Westinghouse Electric & Manufacturing Company and in that time has become thoroughly acquainted with railway matters, especially those pertaining to the mechanical and operating departments, so his entry into the operating end of the industry as an official of an electric railway is not an experiment.

Mr. Rossman was born in Bay City, Mich., on Sept. 17, 1882. He was educated in the public schools there and was graduated from the Bay City High School in 1900. He started work with the Westinghouse Electric & Manufacturing Company as helper in the construction department in Philadelphia on July 1, 1900. After about two years there he was sent to East Pittsburgh, where he served two years as an engineering apprentice. In 1904 he was placed in the construction department and followed that class of work for four years. He was then appointed district engineer of the Cleveland office of the company. In 1909 Mr. Rossman entered the sales department and has followed railway work closely since that time. Since 1916 he has been manager of the Kansas City office of the Westinghouse Company. While he was located in Cleveland Mr. Rossman had charge of the construction of the Youngstown & Ohio River Railroad, the Cleveland, Ashland & Mansfield Railroad and the extensions to the Lake Shore Electric Railway.

Railway Men, Manufacturers and Others Attend

Among those present at the dinner to Mr. Rossman were:

C. E. Allen, N. B. Johnson, B. W. Stemmerich, J. S. Warren, Graeme Ross, R. C. Redhead, G. S. Gillespie, F. S. Detweiler, of the Westinghouse Electric & Manufacturing Company; W. M. Hand and F. R. Johnson of the General Electric Company; F. G. Buffe, J. A. Harder, D. E. Druen, I. R. Carson, C. A. Kincade, R. S. Neal, H. M. Smith, J. J. Fitzmorris, C. L. Carr, A. E. Harvey, E. E. Stigall, D. L. Fennell and R. W. Bailey of the Kansas City Railways; B. C. Adams, H. C. Porter, Frank Harrington and F. E. Henderson of the St. Joseph Railway, Light, Heat & Power Company; H. B. Burton, Mayor, Kansas City, Kan.; L. H. Chapman, commissioner Water & Light, Kansas City, Kan.; J. D. Donovan, chief engineer, Kansas City, Kan.; A. E. Baum and J. M. Dapron of the Westinghouse Traction Brake Company; J. A. Weimer and C. W. Way of the Kansas City, Clay County & St. Joseph Railway; K. D. Klemm and O. S. Lamb of the Kansas City, Kaw Valley & Western Railway, and P. J. Kealy, F. S. Dewey, F. L. Markham, F. V. Cook, Nic Le Grand, L. E. Gould, E. T. Bronenkamp, D. O. Vaughn and H. S. Day.

Arrangements for the dinner were handled by a committee consisting of E. E. Stigall, purchasing agent of the Kansas City Railways; B. C. Adams; D. L. Fennell, superintendent of transportation of the Kansas City Railways; F. V. Cook of the Ohio Brass Company; and W. M. Hand.

A. F. Kertsing has resigned as manager of the Citizens Gas Company in Jackson, Tenn., to accept a post with the Carolina Light & Power Company.

Mr. Shartel Made President

Former Vice-President and General Manager of Oklahoma Road Succeeds Late Mr. Classen

John W. Shartel, vice-president and general manager of the Oklahoma Railway, Oklahoma Cty, Okla., and long an associate of the late Anton H. Classen, president of the company, has been elected president of the company to succeed Mr. Classen. Mr. Shartel and Mr. Classen share almost equally between them the honor for the excellent system of transportation which the residents of Oklahoma City now enjoy. Each of these men in his respective field made the success of the enterprise possible.

In the brief period of twenty years the city grew from a town of 15,000 to a city of 100,000 population. The



J. W. Shartel

local company was liberal, almost to the extent of being radical, in building new lines through unsettled territory. Much private right-of-way was secured and land obtained for terminals with the result that the railway system in Oklahoma is one of the best laid out, if not quite the best, to be found anywhere in a city of similar size in the civilized world.

That sounds like an all-embracing statement, but it needs no other qualifications than those previously mentioned. Moreover, the company has been uniformly successful, a statement that is also mighty significant considering the adverse conditions affecting electric railways everywhere during the war-time period.

John W. Shartel, the new president of the company, was born in Harmonsburg, Pa., on May 1, 1862. Soon thereafter his parents moved to Missouri, where Mr. Shartel received his early education in the county schools. He was graduated from Kansas Agricultural College, Manhattan, Kan., in 1884. After leaving college Mr. Shartel went to Topeka, Kan., and studied law. He was admitted to the bar in 1885 and practiced law in Topeka for a year. He then went to Sedan, Kan. After serving three years there as county attorney he formed a partnership in 1890 with W. C. Hackney, and prac-

ticed at Winfield, Kan., until Jan. 1, 1893, when he moved to Guthrie, Okla., where the firm of Asp, Shartel & Cottingham was formed.

In 1898 Mr. Shartel went to Oklahoma City and became general attorney for the Choctaw, Oklahoma & Gulf Railroad, which position he held until 1901. Several years later he formed a law partnership with J. R. Keaton and Frank Wells. This connection continued until 1912, when he retired in order to devote his time to the Oklahoma Railway, which he had helped to organize in 1902 and which had grown meanwhile to such proportions that the conduct of the company's affairs required the greater part of his time.

In 1920 he was elected president of the Oklahoma Utilities Association and the following year was reelected to that office, the precedent of a single term for that office having been abandoned. Mr. Shartel is also a director of the Chamber of Commerce of the United States, representing the fifth district. He was elected to this office at the last annual meeting of the chamber, held in Washington in May, 1922.

Engineer Resigns

Richard Sachse Will Work Up Plans for Unifying Railway Lines in Los Angeles

Richard Sachse, chief engineer of the California Railroad Commission, resigned Feb. 21 to engage in the work of fixing the valuation of the properties of the Los Angeles Railway and the Pacific Electric Railway in the proposed unification plan. Mr. Sachse's work will be to determine the costs of the properties so as to ascertain the sum to be paid for the properties taken over, depending on which plan is the one to be finally accepted.

Since the railway lines involved will assume the expense of the proposed surveys, Mr. Sachse will be engaged by them in handling the surveys. He will also represent the Railroad Commission. Likewise, he will serve the city of Los Angeles in a supervisory capacity, if the city decides that his services are needed in this respect. It is understood that Mr. Sachse resigned his post with the Railroad Commission primarily to take up private engineering practice in Los Angeles. Mr. Sachse announced more than a year ago his plans for leaving the commission.

Mr. Sachse entered the service of the California State Railroad Commission in 1912 and was appointed chief engineer of the commission in 1916. He was recently appointed chairman of the engineering advisory commission on valuation of all railroad and public utility properties in the United States. He was also chairman of the inductive interference commission which investigated all power, railroad and telephone lines in California. As chief engineer of the State Railroad Commission he has had engineering supervision over public utility properties valued at $700,000,000.

During Mr. Sachse's service on the Railroad Commission he has been actively engaged in handling the Los Angeles Plaza Terminal project, which the Railroad Commission ordered be carried out by all the steam road and electric interurban lines entering Los Angeles. The railroads carried the matter to the State Supreme Court on the score that the Railroad Commission lacked jurisdiction and from that body the case went to the Interstate Commerce Commission.

J. W. Nicholson Secretary at Cincinnati

Joseph W. Nicholson, for many years assistant to W. Kesley Schoepf, president of the Cincinnati (Ohio) Traction Company, has been elected secretary of that corporation by the directors. The promotion comes to Mr. Nicholson, one



J. W. Nicholson

of the youngest executives in the electric transportation field, after years of faithful and efficient service. He entered the employ of the company eleven years ago as a stenographer. Mr. Nicholson also has been elected secretary of the Cincinnati Car Company. In 1920 he was elected secretary of the Ohio Traction Company, the parent organization of the Cincinnati Traction Company, which office he still occupies.

William T. Crawford has replaced George A. Peirce as secretary of the Columbia (Ga.) Electric & Power Company.

H. B. Weatherwax, vice-president of the United Traction Company, Albany, N. Y., was recently elected a director of the Champlain Transportation Company.

Senator John H. Trumbull, Plainville, Conn., a director of the Bristol & Plainville Tramway, has been appointed president, pro tem., of the Connecticut State Senate at Hartford.

David L. Starr, attorney and public utility expert, has been elected representative of the Pennsylvania League of Boroughs and Townships on the four-man traction conference board to be created in the proposed reorganization of the Pittsburgh (Pa.) Railways.

Chief Engineer of Los Angeles Board Resigns

H. Z. Osborne, Jr., has resigned as chief engineer of the Los Angeles Board of Public Utilities in order to run for Congress as successor to his father, Congressman H. Z. Osborne, who died recently. Mr. Osborne had been employed by the Los Angeles municipal government for twenty-seven years. He entered the Los Angeles city engineering department after graduating from Leland Stanford University. After serving in various positions in the engineering department for twenty-four years he was appointed to the position of chief engineer of the Board of Public Utilities three years ago.

Mr. Osborne will retain his connection with the semi-official Los Angeles Traffic Commission as chairman of the executive committee. This is an unsalaried position. The commission is organized to make recommendations toward the improvement of relief of traffic conditions. Resolutions were passed by the members of the board expressing regret at Mr. Osborne's resignation and extending appreciation of the service rendered by him.

Mr. Gaboury in New Field

Arthur Gaboury, formerly superintendent of the Montreal (Que.) Tramways, has been elected vice-president and managing director of the American Druggists Syndicate, Ltd., of Canada.

Mr. Gaboury, a well-known figure in the railway field, first became identified with the Montreal Street Railway in 1894 as conductor after he had completed his college course at St. Laurent. It was in the role of conductor and later as a motorman that he learned the practical end of the transportation business. In 1901 he was appointed assistant inspector and from that time on we find him taking on new and bigger responsibilities until in 1906 he was made assistant superintendent. Only one year did he remain assistant superintendent, being appointed superintendent in 1907. This position he held until last fall, when he was allowed a long leave of absence to regain his failing health.

Mr. Gaboury was actively connected with the Canadian Electric Railway Association, at different times being president and treasurer. In the American Electric Railway Association he was also a prominent figure, having been made second vice-president of the Transportation & Traffic Association at the meeting in Chicago last fall. Besides his professional interests Mr. Gaboury gave his services for the advancement of French activities, which in 1918 received public recognition from the French government in the form of a title of Officer of the Academy.

The American Druggists Syndicate, with which Mr. Gaboury's company is affiliated, is a $10,000,000 corporation, with branches throughout the United States and with offices in New York, Chicago and San Francisco. The Canadian branch, which is essentially a Canadian industry in pharmaceutical

products, has its main office in Montreal with branches in Toronto, Winnipeg and Vancouver.

C. H. Goddard, president of the American Syndicate, is also president of the Canadian branch. W. B. Woodland, B. Sc. and Phar. C., was elected treasurer and production manager at the same meeting at which Mr. Gaboury was made an officer of the company.

A. G. Nelson has replaced W. W. Crawford as secretary and treasurer of the Chicago & Interurban Traction Company, Chicago, Ill.

F. G. Hart has replaced C. B. Hamilton as acting superintendent of transporation of the Bloomington & Normal Railway & Light Company, Bloomington, Ill.

Norman W. Mumford has been elected vice-president of the Savannah (Ga.) Electric & Power Company to serve with Harry H. Hunt and Charles F. W. Wetterer.

Victor D. Vickery has been elected vice-president of the Jacksonville (Fla.) Traction Company. Other officials acting in this capacity are Harry H. Hunt and Charles F. W. Wetterer.

Walter S. Lee is now auditor of the Chattahoochee Valley Railway, West Point, Ga., and J. L. Pepper is claim agent. Both positions were formerly combined and were held by Hubert Cumbee.

I. P. Macnab, superintendent of tramways of the Novia Scotia Tramways & Power Company, Halifax, N. S., has resigned. He will accept the position of manager of the Riverside Iron Works, Calgamy, Alta.

C. A. Harvey, associated with the North American Railway Construction Company for fifteen years, has been appointed roadmaster of the Chicago & West Towns Railway, Oak Park, Ill. The appointment became effective on Feb. 11.

Walter M. Bird, formerly general superintendent of the railway department of the Savannah (Ga.) Electric & Power Company, has been appointed manager of the Fort Madison (Iowa) Electric Company. Both properties are under the management of Stone & Webster, Inc., of Boston.

Judge Warren W. Foster has been elected chairman of the executive committee of American Light & Traction Company, New York, N. Y., succeeding the late Emerson McMillin. M. S. Paine, vice-president of the Bowery Bank, New York, has been made a member of the executive committee.

Oscar Johannesen, for several years connected with the Brunswick & Interurban Railway, Brunswick, Ga., in the capacity of superintendent, has resigned from the company to accept an appointment by the Brunswick Board of Trade and the Young Men's Club as port statistician for the port of Brunswick. During his long years of service with the local railway lines Mr. Johannesen made an enviable record for faithful service and efficiency and received many expressions of best wishes from his immediate associates and others for success in his new work.

R. F. Tyson, who has been assistant to the vice-president of the Philadelphia Rapid Transit Company, has been made operating manager of subway-elevated lines of the company, succeeding G. B. Taylor, who resumes his former place as engineer of way. This change in personnel of the company is in addition to the ones noted in the ELECTRIC RAILWAY JOURNAL for Feb. 24, page 353.

N. M. Aycock, formerly superintendent of car maintenance of the Philadelphia (Pa.) Rapid Transit Company, has joined the electric street railways department of the Texas Company, producers of Texaco petroleum products. Mr. Aycock will act in an engineering capacity with the Texas Company. His headquarters will be in New York City.

Matt L. Cobb, has been employed by the Dallas Railway in the claim department. Mr. Cobb is experienced in this work, having served the company in a similar capacity from 1911 to 1914. Mr. Cobb served the people of Dallas County as District Clerk for three successive terms, a period of six years. The last two years of his public service was as deputy tax assessor under W. E. Horton. Mr. Cobb re-enters the employment of the Dallas Railway as assistant claim agent under G. P. Reddick.

James Mangan has been appointed superintendent of the railway department of the Rutland (Vt.) Light & Power Company, W. R. Farr superintendent of the gas department and W. O. Minard superintendent of the electric department. J. M. Eveleth, W. H. Lawson and E. D. Sibley were the former superintendents of these departments. W. H. Lawson was advanced from his position at the head of the gas department to that of assistant manager. W. E. Kampf is operating engineer in the place of C. D. Spencer.

Obituary

Anton H. Classen

Anton H. Classen, president of the Oklahoma Railway, whose death was noted briefly in the ELECTRIC RAILWAY JOURNAL for Feb. 17, was one of the pioneers of Oklahoma and in more than one sense the father of Oklahoma City. He was one of the first men to see the future possibilities of the city and the very first to set systematically about the task of planning for the city's future growth. In the pioneer days there he made an intimate study of cities elsewhere with a population of 100,000 and then set about shaping the development of Oklahoma City to its future requirements as he discerned them.

Mr. Classen was born in 1862. He was graduated from the law school of the University of Michigan and went to Oklahoma from Illinois in 1889 at the opening of the new State. He spent one year in Guthrie and then moved to Edmond. There he became editor of the Edmond *Sun*. In 1895 he was appointed receiver of the land office at Oklahoma City. In 1897 he entered the real estate field in Oklahoma City, in which line he continued active until the time of his death. In 1902 he organized the Classen Company to take over his real estate holdings. It was in this same year that a company was organized to build an electric railway in Oklahoma City. Mr. Classen at once became one of the principal backers of the company. He was connected with the company officially from that time on and in 1903 was made president of the company.

Writing in the issue of *Oklahoma* for Jan. 18, Ed. Overholser, president and manager of the Oklahoma Chamber of Commerce, concluded an appreciation of Mr. Classen with this statement:

> As I sat in the Methodist church the day Mr. Classen was buried and watched Oklahoma City filed by his casket, it occurred to me that a man who could so live that he would receive such homage in his last hour, would leave as a heritage to his family, city, state and nation something of greater value than any hero of wars, holder of office, prince or potentate, and surely such a man will hear the final message: "Well done, thou good and faithful servant . . . enter thou into the joy of the Lord."

Martin Francis Hanley died at Ottawa, Ill., on Feb. 13. He had been in poor health for more than a year, but it was not until quite recently that his condition became critical. Mr. Hanley was claim agent for the Chicago, Ottawa & Peoria Railway and a special investigator for the law firm of Duncan & O'Conor. He had held these positions for the past fifteen years. Mr. Hanley had a very large circle of friends in Ottawa, and was well known in every city in which the Chicago, Ottawa & Peoria Railway operates. He was born in La Salle June 29, 1884, a son of the late Judge and Mrs. Patrick Hanley of La Salle. He is survived by a wife and four children.

William E. Kuhlman, a brother of the late Gustave Kuhlman, founder of the G. C. Kuhlman Car Company, Cleveland, Ohio, is dead. With the passing of William E. Kuhlman one brother is left of the four who, with their father, Fred Kuhlman, Sr., won a niche in the city's cabinet making industry. The oldest was Charles. Next came in order Gustave, William and Fred, who, with two sisters and the widow, Mrs. Anna Kuhlman, survives. Born in Cleveland, William entered his father's cabinet making shop as a boy. Some time later, horse-drawn street cars came into use and the father and the three eldest sons were commissioned to build the first half dozen. With the organization of the G. C. Kuhlman Car Company, William was associated with his brother. A number of years before he opened a wood working shop at E. Fifty-seventh Street, north of Euclid Avenue. This he later sold, but some months before his death he opened another shop. Mr. Kuhlman was sixty years old.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

Car Building Active

Orders for Rolling Stock So Far Placed This Year Running Ahead of 1922

Confirmation was hardly needed of the predictions made previously in the ELECTRIC RAILWAY JOURNAL regarding the outlook in the market for electric railway cars for the year 1923, but it is at hand in the figures of the car building companies with respect to the amount of work on hand as expressed in dollars of business booked. Thus on Feb. 1 the J. G. Brill Company had orders booked for $11,000,000 of work, while the St. Louis Car Company has more than $2,000,000 of work on its books and the Cincinnati Car Company has $5,000,000 of new car construction under way. Here is a total of more than $17,000,000 of work in hand by the three largest manufacturers, to say nothing about orders placed with other builders.

That the electric railways were coming back into the market for equipment was indicated early in 1922 by the record of orders listed from week to week in the ELECTRIC RAILWAY JOURNAL. So pronounced did the tendency become early in 1922 to order new equipment that a survey was made in the issue of this paper for July 1, 1922, which reduced the matter to definite figures. The tendency to buy manifested itself slowly at first, as many buying movements do, but as the year rolled on the orders continued to increase in number and size with the result that the year 1922 closed with nearly 200 per cent increase in rolling stock orders placed, as noted in the ELECTRIC RAILWAY JOURNAL for Jan. 6, 1923.

It might properly be expected that a buying movement which so quickly accelerated its pace and to such proportions would shortly spend its momentum, but such has not been the case judging from the orders so far placed this year of which there is a record and of the inquiries that are out for bids on additional rolling stock.

No doubt much of the buying being done is on account of deferred purchases in the past, but that does not alter or detract from the facts with respect to the indicated total of business now on hand among the car builders. If there is to be any slackening in the market for cars in the near future there has certainly been no indication of any such trend so far this year. Not all the orders so far placed or those likely to be placed in the near future have been recorded in this paper, but enough of them have to show the trend.

As typical of some of the orders placed recently there is one from the Key Route for fifty-five cars, one from the Louisville Railway for fifteen cars, one from the Interstate Public Service Corporation for forty-four cars, one from the Philadelphia Rapid Transit Company for 576 cars, one from the Washington Railway & Electric Company for ten cars, to say nothing of the smaller orders. This is a total of considerably more than 700 cars reported as ordered since the first of the year and places the industry, even allowing for the unusual Philadelphia order, back on the pre-war basis when orders for cars ran from 4,000 to 6,000 a year. So far the new year is running ahead of 1922 with its record of 3,538 cars.

As regards contemplated purchases there is the desire of the city of Seattle to provide the Municipal Railway with from 100 to 200 new cars, the plan of the Los Angeles Railway to build eighty-two cars in its own shops, the contemplated purchase of fifty cars for the Cleveland Railway, the inquiry of the Brooklyn City Railroad for 500 new double-truck cars and the contemplated purchase noted in this week's issue by the Kentucky Traction & Terminal Company of twenty-seven new city cars, a few extra one-man interurban cars and some one-man express cars.

These are merely the outstanding inquiries from the railways among the plans so far made public. Doubtless these represent most of the large additions to rolling stock equipment so far decided of which news has become public, but the list is not meant to be inclusive and probably is far from being so. As a criterion for judging the future, however, the facts set down show, as indicated previously, that the cars so far ordered this year are proportionally in excess of the total of cars ordered for 1922, while purchases contemplated in the future indicate the demand for cars continues unabated.

Large Order for Automatic Substations

The order for automatic substation equipment placed on Feb. 17 by the United Railways & Electric Company of Baltimore is said to be the largest single order ever placed by a city railway company for automatic substation apparatus. There will be four new substations, each containing two 1,500-kw. rotary converters with necessary transformers and control equipment.

The installation will be unique in other respects than size. The new substations are designed to supply power to the central portion of the railway system where the heaviest loads occur, and the four new substations will all be within a mile of each other. This installation will not involve the discontinuance of any of the existing substations. They will be continued in service with manual operation as at present. The company purchases its power at 25 cycles.

The order for substation equipment was placed with the Westinghouse Electric & Manufacturing Company, and it is expected that one or two of these substations will be in service by Dec. 1 and all of them within slightly more than a year. The cost of installation is said to be more than $500,000.

ELECTRIC RAILWAY MATERIAL PRICES—FEB. 27, 1923

Metals—New York

Copper, electrolytic, cents per lb.	16.687
Lead, cents per lb.	8.15
Nickel, cents per lb.	27.50
Zinc, cents per lb.	7.95
Tin, Straits, cents per lb.	44.875
Aluminum, 98 to 99 per cent, cents per lb.	24.00
Babbitt metal, warehouse, cents per lb.:	
Fair grade	42.00
Commercial	25.00

Bituminous Coal

Smokeless mine run, f.o.b. vessel, Hampton Roads	$6.275
Somerset mine run, Boston	4.00
Pittsburgh mine run, Pittsburgh	2.75
Franklin, Ill., screenings, Chicago	2.375
Central, Ill., screenings, Chicago	1.625
Kansas Screenings, Kansas City	2.50

Track Materials—Pittsburgh

Standard Bessemer steel rails, gross ton	$43.00
Standard open hearth rails, gross ton	43.00
Railroad spikes, drive, Pittsburgh base, cents per lb.	2.90
Tie plates (flat type), cents per lb.	2.525
Angle bars, cents per lb.	2.75
Rail bolts and nuts, Pittsburgh base, cents, lb.	4.175
Steel bars, cents per lb.	2.25
Ties, white oak, Chicago, 6i n. x 8 in. x 8½ ft.	1.50

Hardware—Pittsburgh

Wire nails, base per keg	2.80
Sheet iron, (28 gage), cents per lb.	3.50
Sheet iron, galvanized, (28 gage), cents per lb	4.60
Galvanized barbed wire, cents per lb.	3.45
Galvanized wire, ordinary, cents per lb.	2.65

Waste—New York

Waste, wool, cents per lb.	13.50
Waste, cotton, (100 lb. bale), cents per lb.:	
White	12.25
Colored	10.00

Paints, Putty and Glass—New York

Linseed oil, (5 bbl. lots), cents per gal.	99.00
White lead, (100 lb. keg), cents per lb.	13.125
Turpentine, (bbl. lots), per gal.	$1.55
Car window glass, (single strength), first three brackets, A quality, discount*	84.0%
Car window glass, (single strength), first three brackets, B quality, discount*	86.0%
Car window glass, (double strength, all sizes, A quality), discount*	85.0%
Putty, 100 lb. tins, cents per lb.	5.50

*These prices are f.o.b. works, boxing charges extra.

Wire—New York

Copper wire base, cents per lb.	18.75
Rubber-covered wire, No. 14, per 1,000 ft.	7.30
Weatherproof wire base, cents per lb.	17.50

Paving Materials

Paving stone, granite, 4 x 8 x 4, f.o.b. Chicago, dressed, per sq.yd.	$3.60
Common, per sq.yd.	3.15
Wood block paving 3½, 16 treatment, N. Y., per sq.yd.	3.04
Paving brick, 3½ x 8½ x 4, N. Y. per 1,000 in carload lots	50.00
Crushed stone, ¾-in., carload lots, N. Y., per cu.yd.	1.75
Cement, Chicago consumers net prices, without bags	2.20
Gravel, ¾-in., cu.yd., N. Y.	2.00
Sand, cu.yd., N. Y.	1.00

Old Metals—New York

Heavy copper, cents per lb.	13.25
Light copper, cents per lb.	11 75
Heavy brass, cents per lb.	8.00
Zinc, old scrap, cents per lb.	4.75
Yellow brass, cents per lb (heavy)	8.00
Lead, heavy, cents per lb.	6.75
Steel car axles, Chicago, net ton	24.25
Old car wheels, Chicago, gross ton	27.75
Rails (short), Chicago, gross ton	25.25
Rails (relaying), Chicago, gross ton	33.50
Machine turnings, Chicago, net ton	14.25

Rolling Stock

Community Traction Company, Toledo, Ohio, will purchase buses in accordance with a recent ruling of the City Council.

Virginia Railway & Power Company, Richmond, Va., received five new one-man type cars recently from the Brill Company. The cars are for use on the Richmond division and are of the type in use throughout the system.

American Electric Power Company, Philadelphia, Pa., successor to American Railways Company, is considering the purchase of thirty cars within the next six weeks. These cars will be purchased on the car trust plan and will be assigned among the different properties owned by it.

Kentucky Traction & Terminal Company, Lexington, Ky., contemplates the purchase of twenty-seven new city cars, a few additional one-man interurban cars and some one-man express cars. This company was one of the first to use the one-man light-weight car in interurban service, so that the order now contemplated is a repeat one.

Louisville (Ky.) Railway, through Frank Miller superintendent of maintenance and vice-president, reported on Feb. 23 that so far it has taken no action in regard to replacing the fifty-four cars lost to the company in the last six weeks. Thirty-five of these were lost in one fire and seventeen in another, while two were demolished in grade crossing accidents. Mr. Miller stated that he had been busy with plans for rebuilding the two burned carhouses and was not in a position as yet to say much about the rebuilding program for the carhouses or replacement of cars lost by fire and wreck. Some new cars will probably be purchased, although in actual number of cars the company is protected by the new ones which are arriving.

Track and Roadway

Cape Fear Railways, Fayetteville, N. C., will extend its line to Hope Mills and to Manchester.

Louisville (Ky.) Railway will likely extend its Second Street car line to the new park which is being erected by the Louisville Baseball Club. The company has also been requested to arrange new trackage to carry part of the service on the Fourth Street line to the new ball yard during the season.

Houston-Beaumont, Tex. — Ed Kennedy, Houston, Tex., is now at work on a project to build and operate a line from Houston to Beaumont, via Goose Creek, with connection from Beaumont to Port Arthur. Mr. Kennedy has launched several interurban projects which have been carried out and the lines put in operation.

El Paso (Tex.) Electric Railway announces a program of improvements and extensions for 1923 calling for the expenditure of $450,000. A tentative budget prepared by Alba Warren, vice-president and general manager, will be submitted to the directors and, if ratified, work will begin at once on the improvements. These will include several extensions, addition to power plant and replacement of some old cars now in service.

Trade Notes

A. E. Ensell, formerly with the Equipment Corporation of America, is now engaged in the purchase, sale or rental of contractors' railroad, mine, mill and quarry equipment, new, used or rebuilt. He will deal in inspection, appraisals, and retail estimates. He is located at 1628 Market Street, Philadelphia.

Ohio Brass Company, Mansfield, Ohio, has built a new plant at Niagara Falls, Ont., and organized a company to be known as the Dominion Insulator & Manufacturing Company, Ltd., which will manufacture high-tension insulators and such other O. B. products as are sold to any particular extent in the Canadian market.

Portland Cement Association, Chicago, Ill., announces the opening of a new district office in the Hibernia Bank Building, New Orleans. Association Work in Louisiana and Mississippi will be directed from this office. The district engineer in charge of the New Orleans office is John E. Tate, formerly associated with the Atlanta office as field engineer in North Carolina.

The Uehling Instrument Company, Paterson, N. J., has just appointed two new agents, namely, John E. Arnold, 15½ South Fourth Street, Tulsa, whose territory is the State of Oklahoma, and H. R. N. Johnson, 917-A Marquette Avenue, Minneapolis, whose territory is Minnesota, North Dakota and South Dakota. These agents are well acquainted in the power plant field and are thoroughly conversant with the problems necessitating the use of Uehling CO_2 recorders and other Uehling gages.

Mitsui & Company have been appointed exclusive representatives in Japan and China for Uehling CO_2 recording equipment and other Uehling power plant instruments and gages. The head office of Mitsui & Company is located in Tokio and the New York branch office is at 65 Broadway. Many Uehling installations have been made in Japan and China without the aid of local representatives, but it is believed that with the co-operation of the very able engineering department of Mitsui & Company the Japanese and Chinese Uehling customers will be served to the very best advantage.

Combustion Engineering Corporation, New York, N. Y., announces that T. J. Cleary, who has recently opened an office in Atlanta, Ga., for the sale of power plant equipment, has been appointed the company's Southern agent. Mr. Cleary has been a sales engineer in the South for many years and has a thorough knowledge of Southern business methods and power plant problems. By this arrangement the company is enabled to extend to Southern power plants a complete service covering all phases of combustion engineering and to supply equipment of its own manufacture to meet any fuel-burning problem.

Railway Bearing Company, Syracuse, N. Y., capital $200,000, has been formed to manufacture bearings for railway cars. Incorporation papers give Alexander T. Brown, Willard C. Lipe, J. H. T. Bell, Herman Cassler and Harry D. Weed as incorporators. Most of these men have been prominent in the gear industry in Syracuse. Of the capital stock of $200,000, a total of $50,000 is to be preferred to pay 8 per cent, and the balance $150,000 in common stock. The new company is the successor to the Railway Roller Bearing Company and the change in name is to provide for extension of operations.

Globe Ticket Company, Philadelphia, Pa., recently opened a branch factory in Los Angeles, Calif. The new plant is located in the Westinghouse Building, 420 South San Pedro Street. During the last year or two the business of this company has increased to such an extent that it seemed advisable to establish a factory on the west coast. This factory is a complete unit, prepared to turn out all classes of tickets on short notice. C. M. MacAllister, who was in the Philadelphia office for several years, has charge of the Los Angeles factory. The same brand of service that has been the standard of the Globe Ticket Company in Philadelphia for over forty years will be the aim of Mr. MacAllister in operating the Los Angeles plant.

New Advertising Literature

Combustion Engineering Corporation, New York, N. Y., has just published an eleven-page pamphlet describing with illustrations its Combusco water seal ash conveyor.

Nic Le Grand, Inc., Rock Island, Ill., has issued a folder describing some of the railway equipment parts handled. These include safety hand and footholds for cars, improved scrapers, life guards and ball and roller bearings for center plates and side bearings.

Philip Casey Company, Cincinnati, Ohio, has issued a thirty-two page booklet entitled "Insured Results with Concrete Paving." In the introduction it is said that the booklet exhibits what Elastite, "the Sandwich Joint," has accomplished when afforded the opportunity.

The Conveyors Corporation of America, Chicago, Ill., has issued a new folder describing the American airtight door. This door is largely used in ashpits and boiler settings and is made in five sizes 15 x 16, 18 x 18, 22 x 26, 24 x 24 and 24 x 36. The door is of unique design, strong and substantially built of cast iron. When closed and locked it is airtight.



The big graphite bronze bushings on the hand wheel bearings eliminate the need of lubrication

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Ford, Bacon & Davis
Incorporated
Business Established 1894
115 BROADWAY, New York
PHILADELPHIA CHICAGO SAN FRANCISCO

THE J. G. WHITE ENGINEERING CORPORATION
Engineers—Constructors
Industrial Plants, Buildings, Steam Power Plants, Water Powers, Gas Plants, Steam and Electric Railroads, Transmission Systems
43 Exchange Place, New York

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Incorporated
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ON
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215 South Broad Street Philadelphia, Pa.

THE ARNOLD COMPANY
ENGINEERS—CONSTRUCTORS
ELECTRICAL—CIVIL—MECHANICAL
105 South La Salle Street
CHICAGO

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ELECTRIC RAILWAY ENGINEER
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2065-75 Railway Exchange Bldg., St. Louis, Mo.
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Consultant on Fares, Buses, Motor Trucks
Originator of unlimited ride, transferable weekly pass. Campaigns handled to make it a success.
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INVESTIGATIONS COVERING
Reorganization Management Operation Construction
43 Cedar Street, New York City

Parsons, Klapp, Brinckerhoff & Douglas
WM. BARCLAY PARSONS H. M. BRINKERHOFF
EUGENE KLAPP W. J. DOUGLAS
Engineers—Constructors—Managers
Hydro-electric Railway Light and Industrial Plants
Appraisals and Reports
CLEVELAND 1570 Hanna Bldg.
NEW YORK 84 Pine St.

10 seconds to change wheels!

BAYONET

Detachable Trolley Harps

Trolley wheel mileage can be increased and service interruptions reduced when Bayonet Trolley Harps are used. They permit removal of wheel and harp for inspection, lubrication, adjustment or repair. The change is made in a fraction of a minute—no tools needed.

With Bayonet Detachable Harps, there is no need or incentive for running a wheel which needs some minor repair. That's the kind of business which shortens the life of equipment. Bayonet Equipment helps you to prolong its life.



Wheels
Sleet Cutters
Bases with Detachable Pole Clamps

Bayonet Trolley Harp Co., Springfield, Ohio

Transmission Line and Special Crossing Structures, Catenary Bridges
WRITE FOR OUR NEW DESCRIPTIVE CATALOG
ARCHBOLD-BRADY CO.
Engineers and Contractors SYRACUSE, N. Y.

DAY & ZIMMERMANN, INC.
ENGINEERS
Design, Construction
Reports, Valuations, Management
NEW YORK PHILADELPHIA CHICAGO

The Most Successful Men in the Electric Railway Industry read the
ELECTRIC RAILWAY JOURNAL
Every Week

THE P. EDWARD WISH SERVICE
50 Church St. NEW YORK — *Street Railway Inspection* DETECTIVES — 131 State St. BOSTON

When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.

THE COAL & IRON NATIONAL BANK of the City of New York
Capital $1,500,000
Surplus $1,000,000 Und. Profits $363,051
Resources $23,743,000
Offers to dealers every facility of a New York Clearing House Bank.

Dwight P. Robinson & Company
Incorporated
Design and Construction of
Electric Railways, Shops, Power Stations
125 East 46th Street, New York
Chicago Youngstown Dallas
Los Angeles Montreal Rio de Janeiro

J. ROWLAND BIBBINS
Engineer—WASHINGTON, D. C.
TRANSPORTATION
Complete Transit Surveys and Development Programs, Adopting Motor-Transport, R.R. Terminal and City Plans. Traffic, Service, Routing, Operation and Valuation.
EXPERIENCE IN 20 CITIES

IN YOUR BUDGET

Deciding About That Track —OLD or NEW, is EASY

The best is the cheapest—and when the cheapest is the best no need to hesitate. Get prices on the "Ideal Track" the "Continuous Rail" kind, that is

"Jointless", "Bondless" and "Costless"

Indianapolis Welded Joints.....Exterminate maintenance
Indianapolis Welded Joints.....Low in cost, high in efficiency
Indianapolis Welded Joints.....Super-rail, strength and conductivity
Indianapolis Welded Joints.....Any rail, anywhere, any time
Indianapolis Welded Joints.....Proven in performance—10 years' test
Indianapolis Welded Joints.....In use on over 125 different rails
Indianapolis Welded Joints.....In 200 cities, 48 states
Indianapolis Welded Joints.....The last word in track economy

INDIANAPOLIS *Welded Joints*

Applied with the Indianapolis Electric Welder and with Indianapolis Fluxated Welding Steel.

Insures Dependable, "Continuous Rail Track," the only kind of track that will ELIMINATE MAINTENANCE, PRESERVE PAVING, CONSERVE CARS

Thoroly Dependable—Inexpensive—No Bolts—No Bonds—No Maintenance.

The Proof of the Product Is In the Performance

ONE SAYS: Have installed 3,000 pairs since 1917. Thoroly satisfactory and efficient in every respect. Economical and adopted as standard.

ANOTHER SAYS: Have over 6,000 pairs, first installed in 1913, consider them thoroly practical and satisfactory, standard with us.

ANOTHER SAYS: About 2,500 pairs installed since 1907, with very gratifying results.

ANOTHER SAYS: Installed 2,400 pairs, beginning in 1916, with very satisfactory results.

ANOTHER SAYS: Since 1912 have used about 3,000 pairs, standard for our paved tracks.

ANOTHER SAYS: Only begun in 1919, with 500 pairs, uniformly good results.

ANOTHER SAYS: Joints welded in 1916, no maintenance and track apparently "Jointless" today.

ETC., ETC., ETC., ETC., ETC., ETC., ETC.

That "INDIANAPOLIS" *Welders, Steel and Joints*

ARE GOOD, is our claim. That they DO GOOD, is your opportunity. That they have MADE GOOD, is conclusively proven, in that many properties owe their present existence to the use of these products, which are saving hundreds of roads, MILLIONS of DOLLARS ANNUALLY.

To Users—The MORE you USE the MORE you SAVE
To Not-Yet Users—JOIN THE SAVERS

Get our proposition for comparison

The Indianapolis Switch & Frog Co.

SPRINGFIELD, OHIO

J. J. Costello Boston, Mass. New England Representative



The Lid Is Off!

$440,000,000

The best salesman in the Electric Railway Field is about to make another trip. He is scheduled to call on 6000 buyers in the United States and about 700 in Canada and foreign countries.

He will produce a *big volume of business* this trip.

This salesman is ready to make your sales talk for you. He will get orders for you. Many more can be had, if you supply the selling facts and full information about your product. This salesman is the

Annual Maintenance Number

Electric Railway Journal

He reaches people the usual salesman never sees. He can talk with eloquence to men who like him, believe him and who may not know all about what you make.

You can put this remarkable man to work for you at a nominal sum—no traveling expenses.

Why let him go forth without information on your product?

Make sure this man is posted. Wire instructions to him today. Reserve space now. Forms close March 10. Sample copies and rate cards on request.

Yours truly,

Electric Railway Journal

C. Monroe Smith

Advertising Manager

MERITAS
LEATHER CLOTH



A high quality product made for hard wear

Meritas Leather Cloth, the leading leather substitute, is made in a wide range of weights, grains, colors and finishes.

Meritas is made on muslin, drill, duck, moleskin, or canvas, either singly or laminated to obtain a construction of the greatest tensile strength consistent with the proper weight, width and finish for the purpose desired. All of these fabrics are made in our own cotton mills, to conform to standardized specifications, under constant skilled supervision.

The leather-like finish of Meritas Leather Cloth contains no non-drying oils to eventually sweat out and leave the surface hard and brittle. The surface retains its original color, pliancy and brilliancy for years. It is remarkably tough and resists a great amount of scuffing and wear, without abrasion.

Samples for your specific requirements will be sent, on request.

THE STANDARD TEXTILE PRODUCTS CO.
320 BROADWAY, NEW YORK
Dept. E. R. J.

MERITAS STANDARD STP TRADE PROTECTED BRAND REG. U.S. PAT. OFFICE



THERMIT
Insert Welds
99.9%
perfect
in Youngstown, O.

Maintenance cost on joints practically zero

If you could show your Board of Directors a record like that—wouldn't it make them sit up and take notice? It can be done. It is being done!

Look at this story of the Youngstown Municipal Railway Company. In the past six years they have eliminated 2000 joints with Thermit Welds—1998 of them have never cost a cent for maintenance since. That's 99.9% perfect.

Their Engineer says: "The oldest joints have been in for six years and are still in as good condition as when installed. Excepting for the two joints mentioned we have had no expenditures, maintaining any of the joints. We are well pleased with this type of joint and intend to install approximately 250 more this year" (latter part of 1922).

Youngstown confirms what others say—"The first cost is the last cost." ***Find out how low the first cost is.***

Metal & Thermit Corporation

120 Broadway, New York

Pittsburgh Chicago Boston S. San Francisco Toronto

SERVICE STRENGTH THERMIT WELDING ECONOMY

SERVICE STRENGTH THERMIT WELDING ECONOMY

Laying Resilient ties in con *traffic* and without temporary crossovers



DAYTON

crete *without interruption to*

Think of having a permanent, easy-riding track on a permanent concrete foundation without interrupting service during construction and without the expense of temporary crossovers.

On the page opposite are shown city and interurban cars operating on a five- and thirty-minute headway, respectively, while dry concrete is being tamped under the ties.

The setting of unseasoned concrete is not, in any way, disturbed by the operation of the cars over it.

The asphalt cushion in the *resilient* tie absorbs the shocks so effectively that they do not reach the green concrete.

Tests have proved this construction sound. On other properties where this method was employed the concrete was found to be in perfectly good condition after 3 years of service.

Resilient ties are fundamentally and practically right, moreover, they permit of a saving of $6000 a mile over wood ties laid in concrete. *Ask for descriptive literature.*

The Dayton Mechanical Tie Co.
707 Commercial Building, Dayton, Ohio

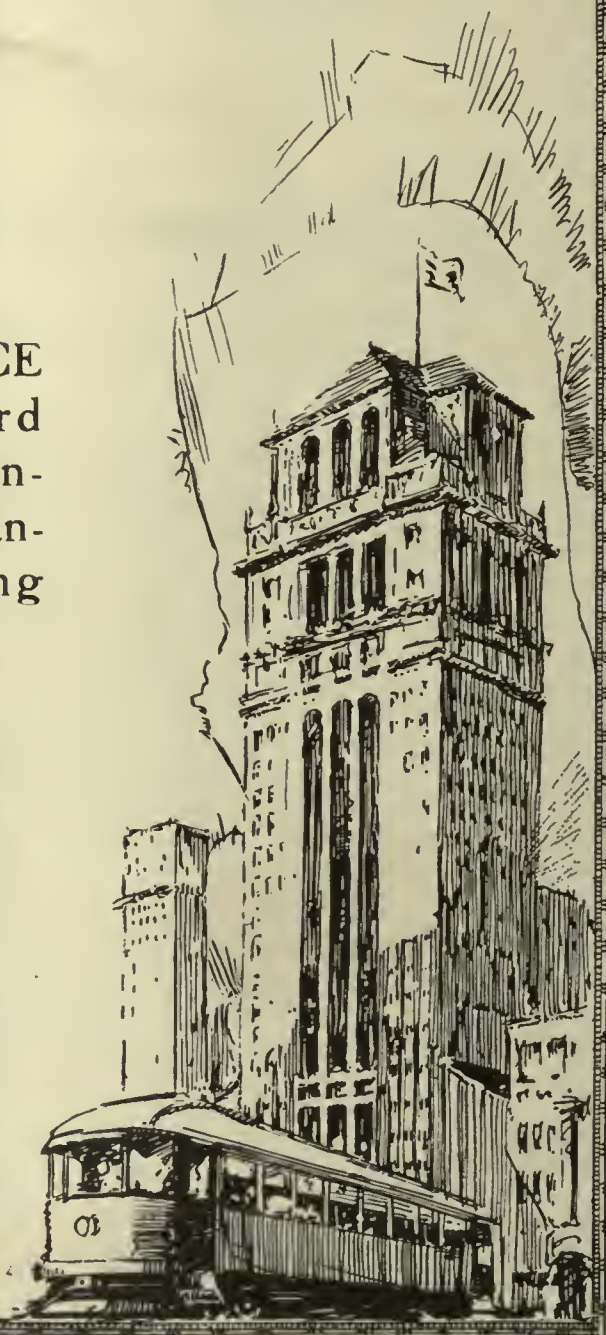
Canadian Representative:
Lyman Tube and Supply Co., Ltd., Montreal, Quebec



Resilient TIE

cushion the shock on the rolling stock

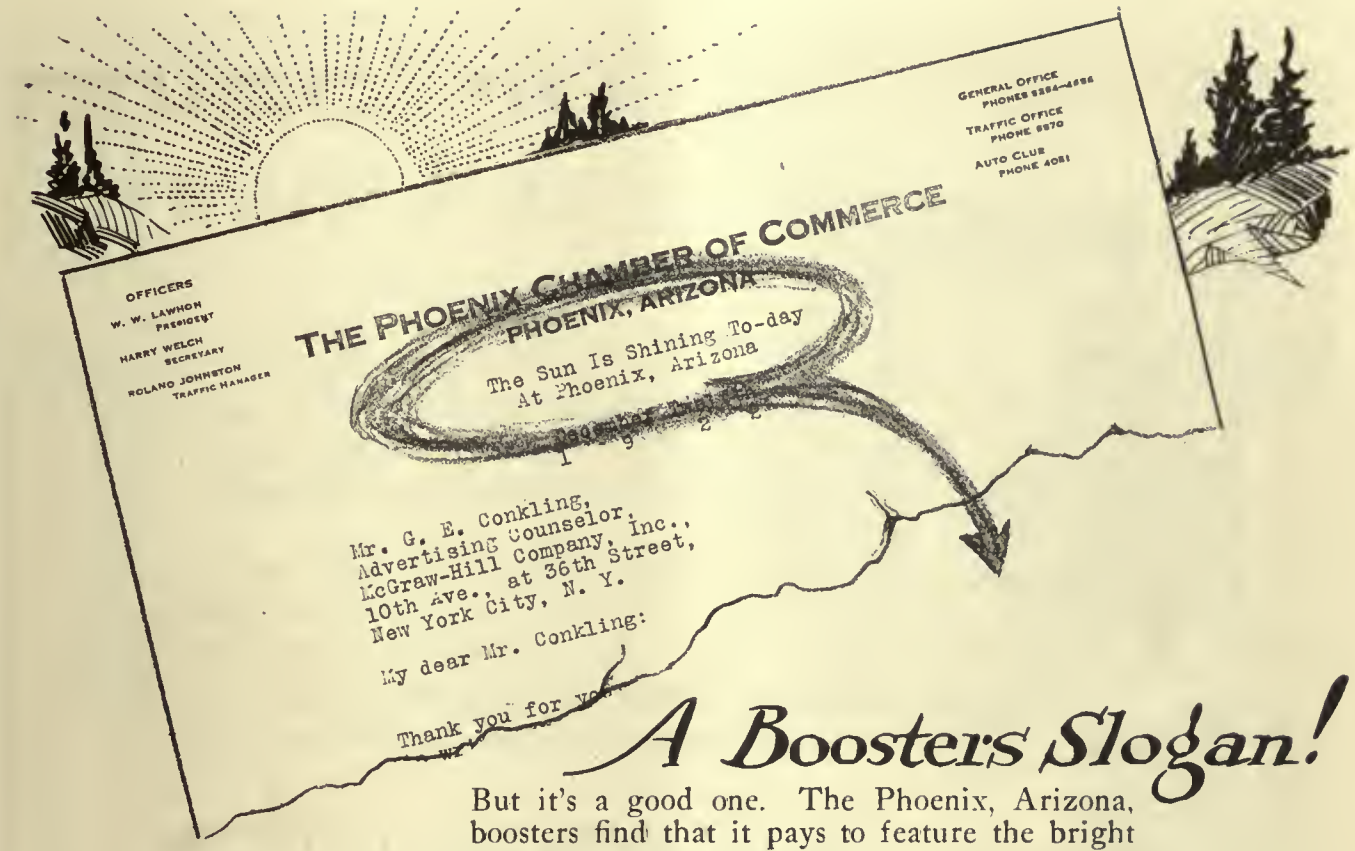
COLLIER SERVICE sustains car card space value by maintaining a nation-wide organization of car advertising experts.



CANDLER BUILDING, THE HOME OF COLLIER SERVICE.

Barron G. Collier INCORPORATED

CANDLER BLDG NEW YORK



A Boosters Slogan!

But it's a good one. The Phoenix, Arizona, boosters find that it pays to feature the bright sunshine of their native state. It attracts instant attention and brings people there.

Are your cars shining today? Advertise with PAINT!

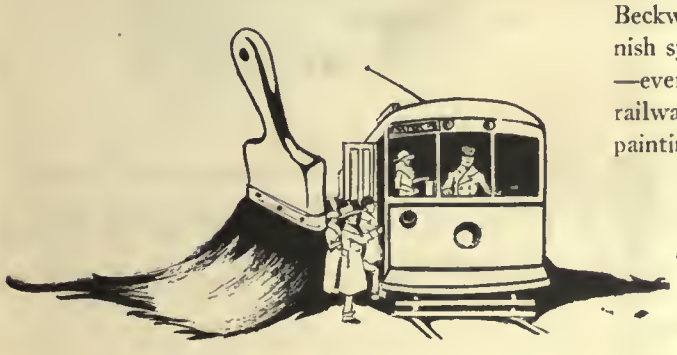
BECKWITH CHANDLER CAR FINISHES
SELL TRANSPORTATION

Like the featured sunlight of Arizona, the freshly painted, glistening street car rivets the attention and reminds the pedestrian that transportation is there at his disposal. And, furthermore, by its refreshingly new appearance, it automatically suggests clean, comfortable and even luxurious accommodation.

Beckwith-Chandler paints and varnishes, especially prepared for car-finishing work, are used by steam and electric railways which are noted for their progressive ideas.

The Beckwith-Chandler Company specializes in car finishes. Beckwith-Chandler makes finishes for the flat color and varnish system, the enamel system, and the color varnish system —everything needed on the outside or inside of the car. Our railway experts can suggest many improvements in your car painting practice which will mean money in your pocket.

Write for further details.



The Beckwith-Chandler Company
320 Fifth Ave., New York
203 Emmett St., Newark, N. J.



Discomfort *is* Unsafe

A CHILLED, uncomfortable motorman cannot give undivided attention to the operation of his car. It's against human nature.

Hours of duty on the platform, alongside constantly opening doors, are not conducive to comfort — unless you make it so.

The CONSOLIDATED Stationary Cab Heater

Keeps the vestibule comfortable. Distinct from the regular car-heating system and subject to individual control.

Connected directly across the line. Controlled by a simple snap switch and fuse, combined.

The perforated case and the louvres in the top permit free circulation of air, utilizing to the utmost the heat produced.

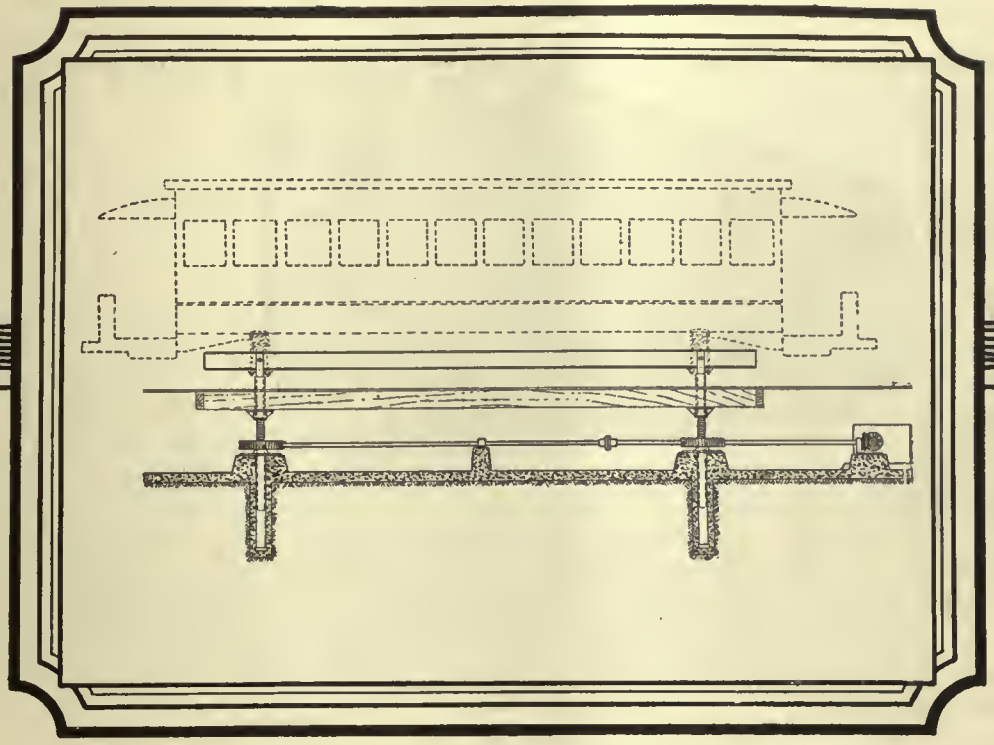
Compact and durable in construction. Trim and neat in appearance. Economical in maintenance.

Let's tell you more about it



CONSOLIDATED CAR-HEATING CO.

New York Albany, N. Y. Chicago



The
COLUMBIA
Electric Car
Hoist

The Columbia Electric Car Hoist is economical, efficient and time-saving.

It will raise a 50 ton car six feet in less than 5 minutes.

It makes car hoisting easy and because of its speed of operation, saves workers' time as well as affording absolute safety to men in the pit, and to equipment.

It can be operated by a discarded electric motor.

We also make special car hoisting machinery for car work shops.

COLUMBIA 18 92 MACHINE WORKS

BROOKLYN, N. Y.



The Philadelphia and Western are using Steel Tired Wheels and Axles, made by the Standard Steel Works Company, who also manufacture Steel Springs, Solid Forged and Wrought Steel Wheels, Steel Forgings, Steel and Malleable Iron Castings and Steel Pipe Flanges.

"Not only to make better products but to make them better understood—not only to sell but to serve, assisting those who buy to choose as well as use their purchases—this is the privilege if not the practice of all modern manufacturers."

—Vauclain

STANDARD STEEL WORKS COMPANY

PHILADELPHIA, PA.

BRANCH OFFICES:

CHICAGO
ST. LOUIS
ST. PAUL, MINN.

HOUSTON, TEXAS
PORTLAND, ORE.

NEW YORK
BOSTON
SAN FRANCISCO

MEXICO CITY, MEX.
PITTSBURGH, PA.
RICHMOND, VA.

WORKS: BURNHAM, PA.



Hudson Valley Ry. Co.

MILLER TROLLEY SHOES

(patented)

more economical on this road too

THREE years ago they decided to try Miller Trolley Shoes on the Hudson Valley Railway Company's cars.

Today this company uses Miller Trolley Shoes exclusively because they find them better than trolley wheels. They report that Miller Trolley Shoes give more mileage with better contact and have no dewirements. Calls for the emergency line crew have been greatly reduced. In every way they agree that Miller Trolley Shoes are more economical.



The Cost is less—the service better

that's the real compelling reason why your road should equip with Miller Trolley Shoes. Arrange for a thorough test now.

Write us today.

MILLER TROLLEY SHOE CO.

Boston-21, Mass.

Western Representative:

Economy Electric Devices Co.
1590 Old Colony Bldg., Chicago, Ill.



It is *not* exaggeration to say that "Boyerized" car parts last three and four times as long as parts of ordinary steel



The New Turnbuckle

Instead of a big coarse-threaded jam nut that needs a two-fisted wrench for application you require only a pocket-size wrench that is applied at a convenient angle. The secret? The jam-nut idea is replaced by a split clamp with a spring power that won't be loosened once the little nut on the side has been tightened.

This new turnbuckle will last as long as the truck, because—

It's Boyerized!

Buyers will generally admit that specially treated steel parts ought to last twice as long as ordinary steel parts.

But they sometimes smile when we tell them that "Boyerized" parts last three and four times as long—*but it's true!*

Other BOYERIZED Parts

Brake Pins
Brake Hangers
Brake Levers
Pedestal Gibs
Brake Fulcrums
Center Bearings
Side Bearings
Spring Post Bushings
Spring Posts
Bolster and Transom Chafing Plates
MacArthur Turnbuckles
Manganese Brake Heads
Manganese Truck Parts
Bushings
Bronze Bearings

Boyerized Parts cost slightly more because they last three or four times as long as parts of ordinary untreated steel. Let us quote you on your requirements.

Bemis Car Truck Company

Electric Railway Supplies
SPRINGFIELD, MASS.

Representatives:

Economy Electric Devices Co., Old Colony Bldg., Chicago, Ill.
F. F. Bodler, 903 Monadnock Bldg., San Francisco, Cal.
W. F. McKenney, 54 First Street, Portland, Oregon
J. H Denton, 1328 Broadway, New York City, N. Y.
A. W. Arlin, 772 Pacific Electric Bldg., Los Angeles, Cal.



Use M.J. Armature Babbitt

It is the least expensive of all babbitt metals, judged by its ability to keep down repair and maintenance expense.

M-J Armature Babbitt is *one* of more than twenty grades of babbitt metal which we manufacture, but it is the *only* grade that we recommend for the hard gruelling service of electric railway armature bearings.

It is *standard* because it goes farther, lasts longer and can be used over and over again.

MORE-JONES BRASS & METAL CO.
St. Louis, Mo.

TROLLEY WHEELS:
V-K *Oil-less*, M-J *Lubricated*

BEARINGS: *"Tiger" Bronze Axle and Armature*

HARPS:
V-K Non-Arcing, M-J Standard

ARMATURE BABBITT
and Similar Products

MORE-JONES BRASS & METAL CO.
St. Louis Missouri
QUALITY PRODUCTS

BUYING
as affected by
SELLING

IT IS to your interest to know that goods are *well sold,* as well as well made. You have to pay the cost of selling just as you have to pay for the cost of manufacturing. Think it over.

And the cost of selling is no small item. In some cases it costs more to sell goods than to make them. The seller who clings to antiquated, expensive methods of selling is no more entitled to your patronage than the one who runs an out-of-date factory, because *you have to pay* the additional costs in either case.

If the waste is to be squeezed out of selling, the buyer cannot escape a share of the responsibility in bringing it about.

THIS means recognizing the efforts of those sellers who have adopted modern, economical methods of selling, and one of these beyond any question is good advertising in good Business Papers.

Advertising not only cuts the cost of selling, but it increases production volume and lowers manufacturing costs. It standardizes quality, and is a guarantee of good faith.

You are invited to consult us freely about Business Papers or Business Paper Advertising

LIST *of* MEMBERS

Each has subscribed to and is maintaining the highest standards of practice in its editorial and advertising service.

Advertising and Selling
American Architect & Architectural Review
American Blacksmith, Auto & Tractor Shop
American Exporter
American Funeral Director
American Hatter
American Machinist
American Paint Journal
American Paint & Oil Dealer
American Printer
American School Board Journal
Architectural Record
Automobile Dealer and Repairer
Automobile Journal
Automotive Industries

Baker's Helper
Bakers Weekly
Boiler Maker (The)
Boot and Shoe Recorder
Brick and Clay Record
Building Age & The Builders Journal
Buildings and Building Management
Building Supply News

Canadian Grocer
Canadian Machinery & Manufacturing News
Canadian Railway & Marine World
Candy and Ice Cream
Chemical & Metallurgical Engineering
Clothier and Furnisher
Coal Age
Concrete
Cotton

Daily Metal Trade
Domestic Engineering
Dry Goods Economist
Drygoodsman
Dry Goods Reporter

Electric Railway Journal
Electrical Merchandising
Electrical Record
Electrical World
Embalmers' Monthly
Engineering and Mining Journal-Press
Engineering News-Record

Factory
Farm Implement News
Fire and Water Engineering
Foundry (The)
Furniture Manufactnrer and Artisan

Garment Weekly (The)
Gas Age-Record
Good Furniture Magazine
Grand Rapids Furniture Record

LIST *of* MEMBERS *(continued)*

Haberdasher (The)
Hardware Age
Hardware & Metal
Heating and Ventilating Magazine
Hide and Leather
Hospital Management
Hotel Monthly
Hotel Review

Illustrated Milliner
Implement & Tractor Trade Journal
Industrial Arts Magazine
Industrial Engineer
Inland Printer
Iron Age
Iron Trade Review

Lumber
Lumber World Review

Manufacturers' Record
Marine Engineering & Shipping Age
Marine Review
Millinery Trade Review
Mill Supplies
Modern Hospital (The)
Motor Age
Motorcycle and Bicycle Illustrated
Motor Truck
Motor World

National Builder
National Cleaners & Dyer
National Laundry Journal
National Miller
National Petroleum News
Nautical Gazette
Northwest Commercial Bulletin

Oil News
Oil Trade Journal

Power
Power Boating
Power Plant Engineering
Printers' Ink
Purchasing Agent

Railway Age
Railway Electrical Engineer
Railway Engineering & Maintenance
Railway Mechanical Engineer
Railway Signal Engineer
Retail Lumberman
Rock Products
Rubber Age

Sanitary & Heating Engineering
Shoe and Leather Reporter
Shoe Retailer
Southern Engineer
Sporting Goods Dealer

Tea and Coffee Trade Journal
Textile World

Welding Engineer
Western Contractor
Wood-Worker (The)

THE ASSOCIATED BUSINESS PAPERS, INC.

JESSE H. NEAL, *Executive Secretary*

HEADQUARTERS: 220 West 42nd STREET NEW YORK CITY

50 Delivery Points



CHILLED IRON WHEELS
for railway and street car service. Capacity 20,000 per day. 25,000,000 in service.

ASSOCIATION OF MANUFACTURERS
OF CHILLED CAR WHEELS
1847 McCormick Bldg., Chicago

THE map above shows the location of the 50 foundries in the United States and Canada, represented by the Association of Manufacturers of Chilled Car Wheels.

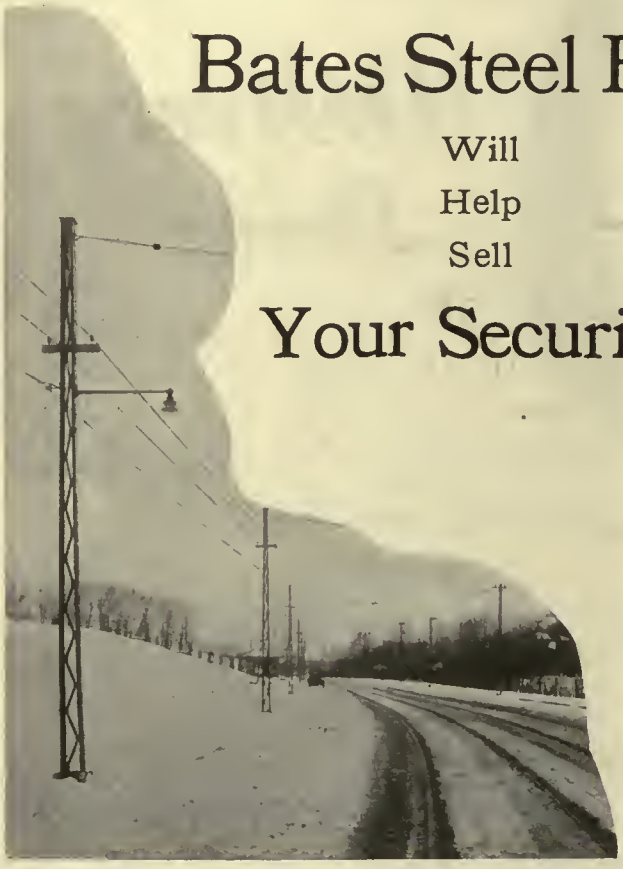
Chicago, 4	Sayre, Pa
St. Louis, 2	Berwick, Pa.
Buffalo, 4	Albeny
Pittsburgh, 2	Toronto
Cleveland, 2	New Glasgow, N. S.
Amherst, N. S.	Madison, Ill.
Montreal	Huntington, W. Va.
Mich. City, Ind.	Wilmington, Del.
Louisville	Houston, Tex.
Mt. Vernon, Ill.	Hennibel, Mo.
Ft. Wayne, Ind.	Reading, Pa.
Birmingham	Baltimore
Atlanta	Richmond, Va.
Savannah	Ft. William, Ont.
Boston	St. Thomas
Detroit	Hamilton
St. Paul	Ramapo, N. Y.
Kansas City, Kan.	Marshall, Tex.
Denver	Los Angeles
Tacoma	Council Bluffs
Rochester, N. Y.	

American Railroad Association Standards

650 lb. wheel for 60,000 Capacity Cars
700 lb. wheel for 80,000 Capacity Cars
750 lb. wheel for 100,000 Capacity Cars
850 lb. wheel for 140,000 Capacity Cars

The Standard Wheel for Seventy-Two Years

CHILLED IRON WHEELS



Bates Steel Poles

Will
Help
Sell

Your Securities

A permanent Bates Pole installation is easy and inexpensive to maintain. All surfaces are exterior and are easily and quickly painted.

Bates Expanded Steel Truss Co.

208 South La Salle Street
CHICAGO, ILL.

Have you your Bates Treatise on Steel Poles?

BATES ONE PIECE EXPANDED STEEL POLES

ANDERSON LINE MATERIAL



Round Top
Straight Line
Suspension



Adjustable Insulated
Crossover

with

Aetna Insulation

For over twenty years, Anderson Line Material has been a leader in the field because of its eminently satisfactory and long service. Aetna Insulation has helped to make this reputation for it.

Aetna Insulation is our own special compound. Developed years ago, it has continued ever since to meet the exacting requirements of electric railroad line service.

—Let us send our catalog—

TRADE A MARK

Reg. U. S. Pat. Off.

Albert & J. M. Anderson Mfg. Co.

Established 1877

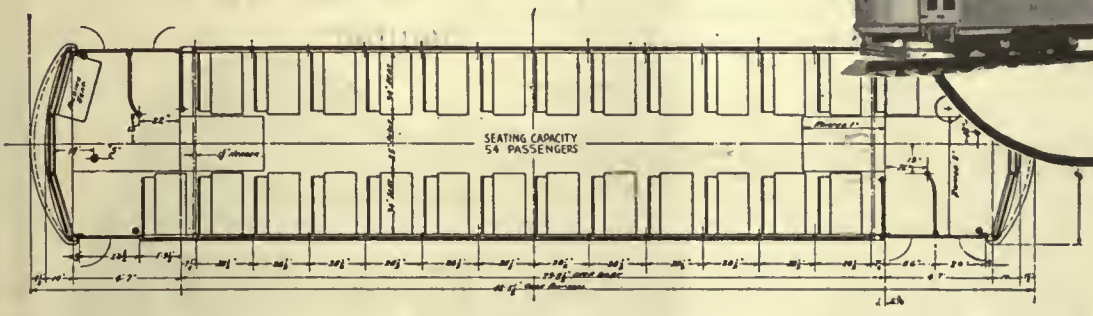
289-293 A St., Boston, Mass.

Branches—New York, 135 Broadway. Philadelphia, 429 Real Estate Trust Bldg. Chicago, 105 So. Dearborn St. London, E. C. 4, 38-39 Upper Thames St.

TRADE AETNA MARK
REGISTERED

Seats 54 passengers and one man can operate it!





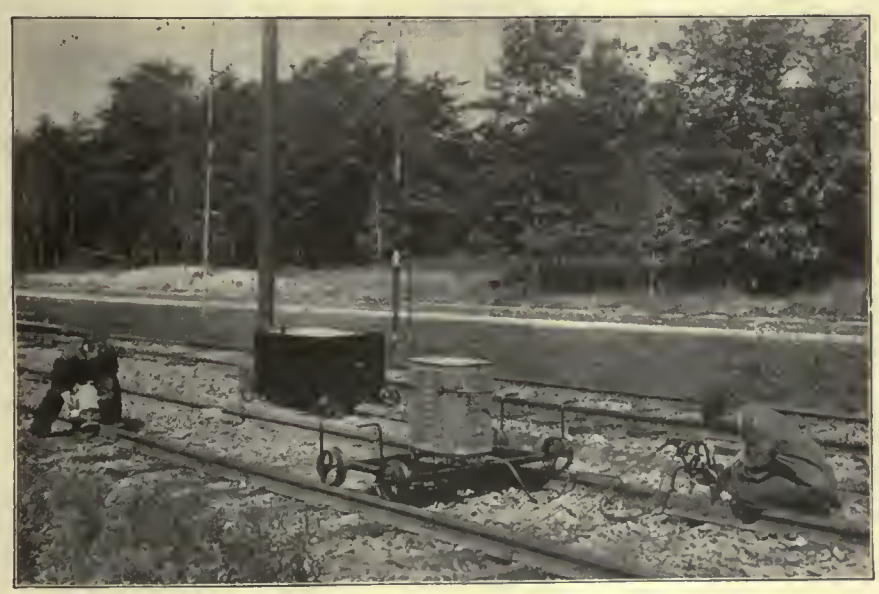
The "Universal" Standardized Safety Car

Combines the best results of all the various experiments with double-truck, one-man, two-man cars. Furthermore, it includes all the successful "safety" features, and interlocking control of doors, brakes and emergency provisions, which have become standard on the single-truck Birney "Safety." The Universal Safety Car, with its light weight, its large carrying capacity, its separate entrance and exit facilities, and its standardized construction will increase your profits.

Write for full details.

St. Louis Car Company, St. Louis, Mo.

"The Birthplace of the Safety Car"



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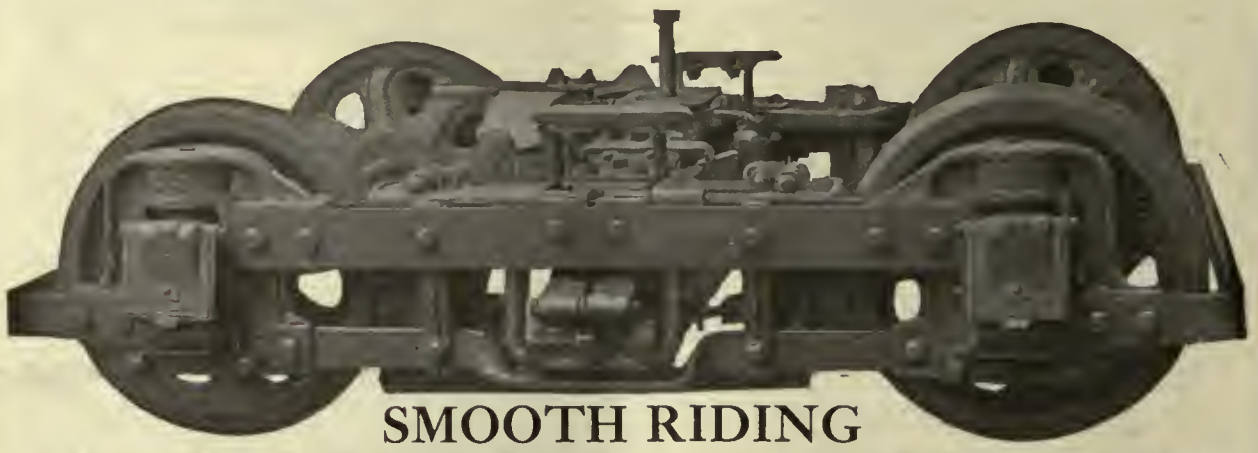
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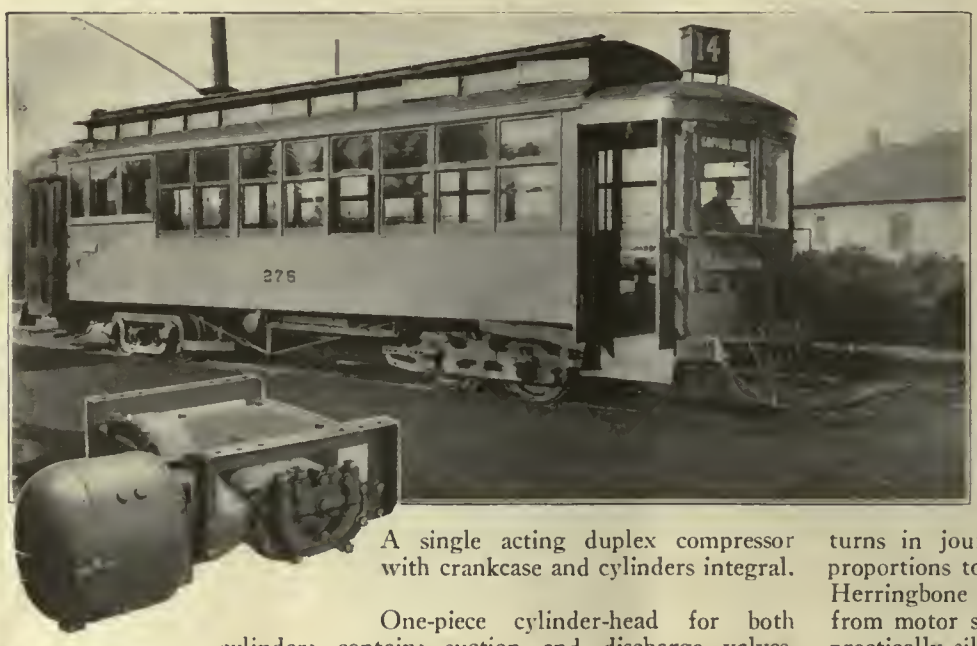
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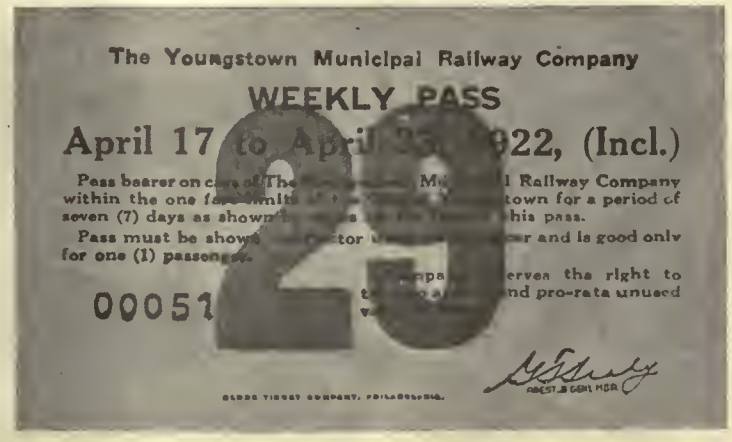
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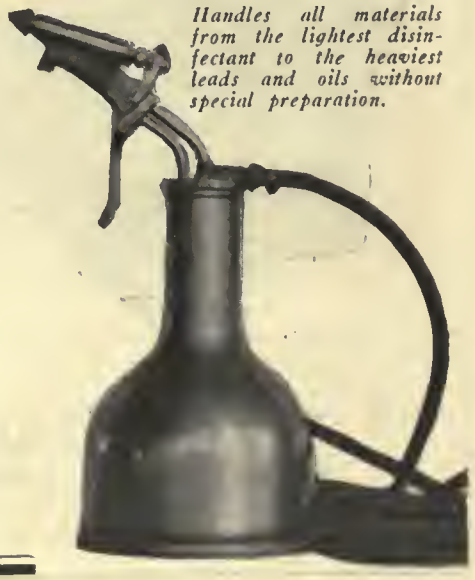


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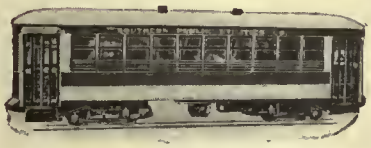
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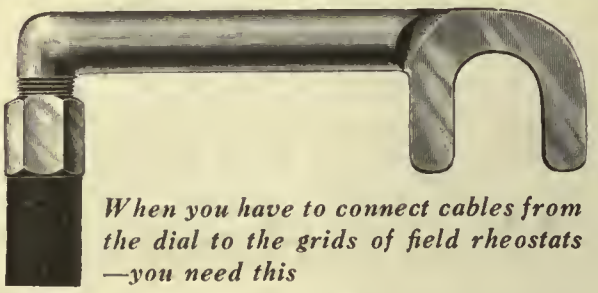
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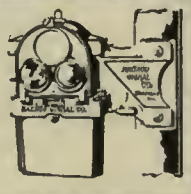
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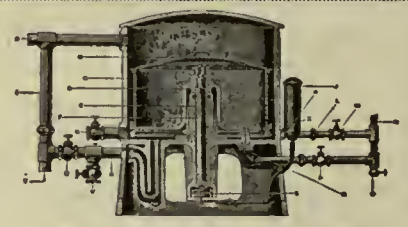
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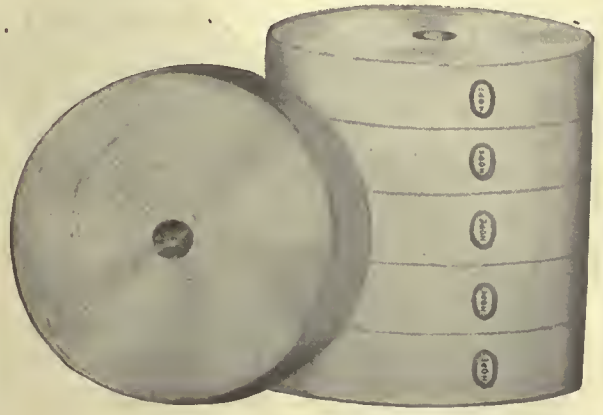


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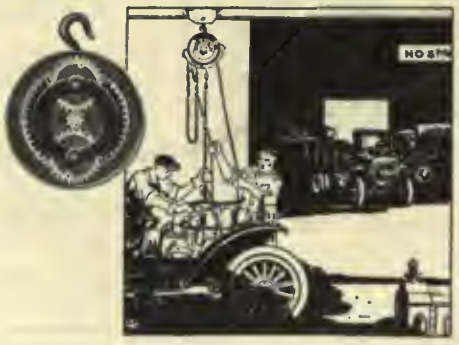
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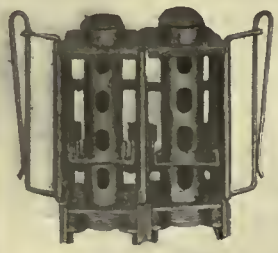
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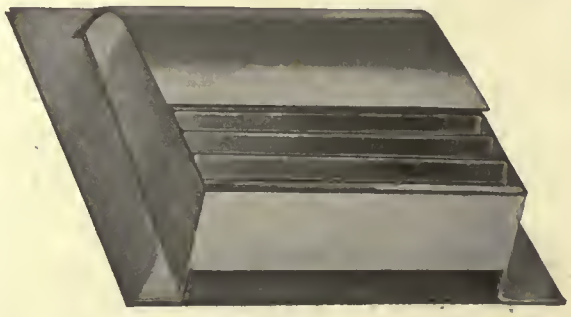


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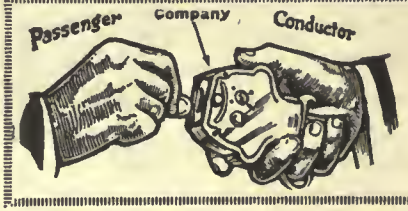
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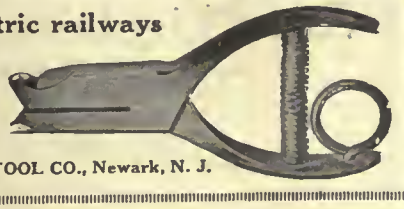
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Passengers
Rooke Automatic Register Co.
Providence, R. I.

75% of the electric railways use
B-V Punches



Send for Catalog
BONNEY-VEHSLAGE TOOL CO., Newark, N. J.

PS HEATERS

Car Heating and Ventilation
is one of the winter problems that you must settle without delay. We can show you how to take care of both, with one equipment. Now is the time to get your cars ready for next winter. Write for details.

The Peter Smith Heater Company
1725 Mt. Elliott Ave., Detroit, Mich.

Car Seating, Broom and Snow Sweeper Rattan, Mouldings, etc.

AMERICAN RATTAN & REED MFG. CO.
Brooklyn, N. Y.

AMERICAN means QUALITY
RATTAN SUPPLIES OF EVERY DESCRIPTION



STUCKI SIDE BEARINGS

A. STUCKI CO.
Oliver Bldg.
Pittsburgh, Pa.

The Right to Advertise

by FESTUS J. WADE, *President*
Mercantile Trust Company
of St. Louis

I repeat I am prejudiced in favor of advertising. But I am not guessing. I have seen what it has been able to do.

Advertising is almost as necessary to the bank, particularly the one offering a diversified service, as it is to the department store.

It is a powerful force, and no one deserving the right to apply it to his business should be denied that right.

[Published by the Electric Railway Journal in co-operation with The American Association of Advertising Agencies]

The Differential Car

An automatic dump car, an electric locomotive, a snow plow, and a freight car—all in one. Big savings shown in track construction and maintenance, paving work, coal hauling, ash disposal, snow removal, and freight transportation.



The Differential Steel Car Co.
Findlay, Ohio



Defective Wheels Corrected While They Run

WHEEL TRUING BRAKE SHOES

—keep your cars and wheels in service. Abrasive blocks in various sections correct flattening or wear on any part of flange or tread. Write for booklet.

Wheel Truing Brake Shoe Co.
Detroit, Mich.

Trade Mark—Wheel Truing Brake Shoe

Braymer's
ARMATURE WINDING AND MOTOR REPAIR

15 *pages* 6 x 9, *illustrated.* $3.00 *net, postpaid*

This book is a compilation of practical methods used by repairmen and armature winders. It gives in detail those methods which have been found by actual experience to represent best practice in a repair shop of average size.



McGraw-Hill Book Co., Inc.,
370 Seventh Ave., New York, N. Y

You may send me on 10 days' approval Braymer's Armature Winding and Motor Repair, $3.00 net, postpaid. I agree to pay for the book or return it postpaid within 10 days of receipt. Regular subscriber to the Electric Railway Journal?.....
Member of A. I. E. E?.....
Signed.....
Address.....
Name of Company.....Official Position.....
(Books sent on approval to retail purchasers in the U. S. and Canada only.) F.E.

"Make it of Vul-Cot Fibre"

NATIONAL VULCANIZED FIBRE CO.
WILMINGTON DELAWARE



CHILLINGWORTH

One-Piece Gear Cases
Seamless—Rivetless—Light Weight
Best for Service—Durability and Economy. *Write Us.*

Chillingworth Mfg. Co.
Jersey City, N. J.

A Single Segment or a Complete Commutator

is turned out with equal care in our shops. The orders we fill differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we can make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.

Cameron Electrical Mfg. Co., Ansonia, Connecticut

Shaw Lightning Arresters

Standard in the Electric Industries for 35 years

Henry M. Shaw
150 Coit St., Irvington, Newark, N. J.

BUCKEYE JACKS

high-grade R. R. Track and Car Jacks

The Buckeye Jack Mfg. Co.
Alliance, Ohio

Rolled and Forged
GEAR BLANKS

Midvale Steel and Ordnance Company
Cambria Steel Company
General Offices:
Widener Building, Philadelphia, Pa.

SEARCHLIGHT SECTION

EMPLOYMENT-BUSINESS OPPORTUNITIES-EQUIPMENT

UNDISPLAYED—RATE PER WORD:

Positions Wanted, 4 cents a word, minimum 75 cents an insertion, payable in advance.

Positions Vacant and all other classifications, 8 cents a word, minimum charge $2.00.

Proposals, 40 cents a line an insertion.

INFORMATION:

Box Numbers in care of any of our offices count 10 words additional in undisplayed ads.

Discount of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

DISPLAYED—RATE PER INCH:

1 to 3 inches.....$4.50 an inch
4 to 7 inches..... 4.30 an inch
8 to 14 inches..... 4.10 an inch

An advertising inch is measured vertically on one column, 3 columns—30 inches—to a page.

E. R. J.

POSITIONS VACANT

AN EXPERIENCED engineer wanted, capable of doing drafting and designing work of electric railway equipment devices. Prefer a man with shop experience. Excellent opportunity for advancement with old established concern. P-526, Electric Railway Journal, 10th Ave. at 36th St., New York.

ARMATURE winder to act as foreman in small shop near New York. State age, experience, salary. P-527, Electric Railway Journal, 10th Ave. at 36th St., New York.

DRAFTSMEN calculators wanted on special track work. With or without experience but must have thorough working knowledge of mathematics. P-518, Electric Railway Journal, Real Estate Trust Bldg., Phila., Pa.

FIRST class armature winder, one familiar with street railway motors. Address Master Mechanic, P. O. Box 407, Rensselaer, N. Y.

POSITIONS WANTED

MASTER mechanic desires position on small city or interurban property. I am at present employed and can give good references. PW-506, Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.

MR. MANAGER, are you in need of a capable, practical superintendent of transportation who is fully competent to take over all details and handle same in a manner that would be a credit to your property? Successful in public relations, safety campaigns and capable of getting results from employees; recognized as an economical operator. At present with large property; present relations are pleasant; personal reasons for desiring a change to another property. A proven record of eighteen years with large city, suburban and interurban properties with high grade references is back of this ad. PW-520, Elec. Railway Journal, Leader-News Bldg., Cleveland, Ohio.

SUPERINTENDENT of transportation or superintendent secret service. Twenty years' experience in electrical line, operating city, interurban and suburban property. Good record based on long experience with large property. Present relations are pleasant—personal reasons for desiring a change. PW-617, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

SUPERINTENDENT of equipment, with good record based on broad experience, city and interurban, now employed, desires a change. Willing to rebuild run down property. Interview solicited. PW-525, Electric Railway Journal, 10th Ave. at 36th St., New York.

CHIEF engineer or superintendent, broad experience in power, refrigeration, mining and industrial equipment. Graduate combustion engineer. R. B. Hutchason, New Athens, Ill.

REPRESENTATION AVAILABLE

Ohio Representation

Established manufacturers agent covering Ohio desires account with manufacturer of electric railway equipment. RA-523, Electric Railway Journal, Leader-News Bldg., Cleveland Ohio.

WANTED

Street Car Registers

Up to 150; either single or double reading. Give make, model, lowest price and when available.

W-524, Electric Railway Journal
Rialto Bldg., San Francisco, Calif.

NEW CAST IRON WHEELS FOR SALE

On account of discontinuing cars on which wheels were formerly used National Car Wheel Co's make

269—20-in. diam. Spoke, 3¾-in. rough bore. Approximate weight 190 lbs. Griffin Wheel Co.'s Make.

350—24-in. diam., 4¼-in. rough bore—double plate. Approx. weight 325 lbs.

147—33-in. diam. rough bores, 4¾-in. to 6-in. double plate. Approximate weight 530 lbs. each.

24—33-in. Motor Wheels. Approximate weight 815 lbs.

20—39-in. Trailer Wheels. Approximate weight 645 lbs.

1½ cent per lb. f.o.b. Boston.

Boston Elevated Railway
Purchasing Agent
108 Mass. Ave., Boston

FOR SALE

20—Peter Witt Cars

Weight Complete, 33,000 lbs.

Seat 53. 4—G. E. No. 258-C Motors. K-12-H Control, West. Air Taylor Trucks. R.H. Type. Complete.

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa.

Sell Your Idle Equipment

Tell others in the field what you wish to dispose of. Buyers in the market look here for good used machinery.

Advertising in the *Searchlight Section* costs little and usually brings prompt and satisfactory returns.

Let "Searchlight" Help You

G-17

New Motor Repair Parts

IMMEDIATE SHIPMENT

We have in stock virtually every part necessary to complete all of the types of non-interpole motors. They are new and were manufactured by either the Westinghouse Company or the General Electric Company. They may be purchased at 25 per cent less than the manufacturers present prices.

Send your orders to us and deduct 25 per cent from the current quotations.

What have you for sale?

TRANSIT EQUIPMENT CO.
Cars—Motors
501 Fifth Avenue, New York.

FOR SALE—A BARGAIN

4—Passenger Motor Cars—4

Weight 47,000 lbs. Geared 84-20

Single end cars—Leather upholstered seats

Seats 44—Passenger Compartment 32 and Smoker 12

4 G.E. 203-L Motors—K-35-G Control

St. Louis No. 47-B Trucks—Steel Body

Have been run only 357,000 miles per car at low speed and have always been properly maintained.

Are in excellent condition in every way!

El Paso Electric Railway Co.
P. O. Box 431, El Paso, Texas

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car
Collier, Inc., Barron G.
Air Receivers, Aftercoolers
Ingersoll-Rand Co.
Ammeters
Roller-Smith Co.
Anchors, Guy
Electric Service Supplies Co.
Ohio Brass Co.
Westinghouse Elec. & M. Co.
Armature Shop Tools
Elec. Service Supplies Co.
Automatic Return Switch Stand
Ramapo Ajax Corp.
Automatic Safety Switch Stands
Ramapo Ajax Corp.
Axle Straighteners
Columbia M. W. & M. I. Co.
Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Cambria Steel Co.
Carnegie Steel Co.
Midvale Steel & Ord. Co.
St. Louis Car Co.
Standard Steel Works Co.
Taylor Electric Truck Co.
Westinghouse Elec. & M. Co.
Babbitt Metal
Ajax Metal Co.
More-Jones B. & M. Co.
Babbitting Devices
Columbia M. W. & M. I. Co.
Badges and Buttons
Electric Service Supplies Co.
International Register Co., The
Bankers and Brokers
Coal & Iron National Bank
Batteries, Dry
Nichols-Lintern Co.
Bearings and Bearing Metals
Ajax Metal Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
General Electric Co.
A. Gilbert & Sons B. F. Co.
Le Grand, Inc., Nic.
More-Jones Br. & Metal Co.
Taylor Electric Truck Co.
Westinghouse Elec. & M. Co.
Bearings, Center and Roller Side
Stucki Co., A.
Bearings, Roller
Stafford Roller Bearing Car Truck Co.
Bells and Gongs
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Consolidated Car Heating Co.
Elec. Service Supplies Co.
Benders, Rail
Ry. Track-work Co.
Boilers
Babcock & Wilcox Co., The
Boiler Tubes
Cambria Steel Co.
Midvale Steel & Ord. Co.
Bond Testers
Amer. Steel & Wire Co.
Elec. Service Supplies Co.
Rail Welding & Bonding Co.
Bonding Apparatus
Amer. Steel & Wire Co.
Elec. Ry. Imp. Co.
Elec. Service Suplies Co.
Indianapolis Switch & Frog Co.
Ohio Brass Co.
Railway Track-work Co.
Rail Welding & Bonding Co.
Bonds, Rail
Amer. Steel & Wire Co.
Elec. Railway Imp. Co.
Elec. Service Supplies Co.
General Electric Co.
Ohio Brass Co.
Railway Track-Work Co.
Rail Welding & Bonding Co.
Westinghouse Elec. & M. Co.
Book Publishers
McGraw-Hill Book Co.
Boxes, Switch
Johns-Pratt Co.
Brackets and Cross Arms (See also Poles, Ties, Posts, etc.)
Bates Exp. Steel Truss Co.
Creaghead Eng. Co.
Elec. Ry. Equip. Co.
Elec. Service Supplies Co.
Hubbard & Co.
Ohio Brass Co.
Brake Adjusters
Nat'l Ry. Appliance Co.
Westinghouse Tr. Br. Co.
Brake Shoes
Amer. Brake Shoe & Fdry. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Taylor Electric Truck Co.
Wheel Truing Brake Shoe Co.
Brakes, Brake Systems and Brake Parts
Ackley Brake & Sup. Corp.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
National Brake Co.
Safety Car Devices Co.
Taylor Electric Truck Co.
Westinghouse Tr. Br. Co.
Brooms, Track, Steel and Rattan
Amer. Rattan & Reed Mfg. Co.
Brushes, Carbon
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
Westinghouse Elec. & M. Co.
Brush Holders
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Brushes, Wire Pneumatic
Ingersoll-Rand Co.
Buses, Motor
Brill Co., The J. G.
St. Louis Car Co.
Bushings
Nat'l Vulcanized Fibre Co.
Bushings, Case Hardened and Manganese
Bemis Car Truck Co.
Brill Co., The J. G.
Bus Seats
Hale & Kilburn Corp.
Heywood-Wakefield Co.
Cables
(See Wires and Cables)
Cambric Tapes, Yellow & Black Varnish
Irvington Varnish & Ins. Co.
Carbon Brushes
(See Brushes, Carbon)
Car Lighting Apparatus
Elec. Service Supplies
Car Panel Safety Switches
Consolidated Car Heating Co.
Westinghouse Elec. & M. Co.
Cars, Dump
Differential Steel Car Co., Inc.
Cars, Gas Rail
St. Louis Car Co.
Cars, Passenger Freight Express, etc.
American Car Co.
Brill Co., The J. G.
Cambria Steel Co.
Kuhlman Car Co., G. C.
McGuire Cummings Mfg. Co.
Midvale Steel & Ord. Co.
National Ry Appliance Co.
Perley A.
St. Louis Car Co.
Thomas Car Works,
Wason Mfg. Co.
Cars, Second Hand
Electric Equipment Co.
Cars, Self-Propelled
General Electric Co.
Castings, Brass, Composition or Copper
Ajax Metal Co.
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
More-Jones Br. & Metal Co.
Castings, Funnel
Wharton, Jr., & Co., Inc.
Wm.
Castings, Gray Iron and Steel
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Standard Steel Works Co.
Wharton Jr., & Co., Inc., Wm.
Castings, Malleable and Brass
Amer. Brake Shoe & Fdry. Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Le Grand, Inc, Nic
Catchers and Retrievers Trolley
Earll, C. I.
Eclipse Railway Supply Co.
Electric Service Sup. Co.
Ohio Brass Co.
Wood Co., Chas. N.
Catenary Construction
Archbold-Brady Co.
Circuit Breakers
General Electric Co.
Westinghouse Elec. & M. Co.
Clamps and Connectors for Wires and Cables
Anderson Mfg. Co., A. & J. M.
Dossert & Co.
Electric Railway Equip. Co.
Elec. Service Supplies Co.
General Electric Co.
Hubbard & Co.
Westinghouse Elec. & M. Co.
Cleaners and Scrapers, Track (See also Snow-Plows, Sweepers and Brooms)
Brill Co., The J. G.
Ohio Brass Co.
Clusters and Sockets
General Electric Co.
Coal and Ash Handling (See Conveying and Hoisting Machinery)
Coil Banding and Winding Machines
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Coils, Armature and Field
Columbia M. W. & M. I. Co.
General Electric Co.
Rome Wire Co.
Westinghouse Elec. & M. Co.
Coils, Choke and Kicking
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.
Coin-Counting Machines
International Register Co. The
Johnson Fare Box Co.
Commutator Slotters
Electric Service Supplies Co.
General Electric Co.
Westinghouse Elec. & M. Co.
Commutator Truing Devices
General Electric Co.
Commutators or Parts
Cameron Elec'l Mfg. Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse Elec. & M. Co.
Compressors, Air
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Tr. Br. Co.
Compressors, Air Portable
Ingersoll-Rand Co.
Compressors, Gas
Ingersoll-Rand Co.
Concrete Reinforcing Bars
Cambria Steel Co.
Midvale Steel & Ord. Co.
Condensers
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Elec. & M. Co.
Condenser Papers
Irvington Varnish & Ins. Co.
Conduits, Underground
Std. Underground Cable Co.
Connectors, Solderless
Dossert & Co.
Westinghouse Elec. & M. Co.
Connectors, Trailer Car
Consolidated Car Heating Co.
Elec. Service Supplies Co.
Ohio Brass Co.
Controllers or Parts
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse Elec. & M. Co.
Controller Regulators
Electric Service Supplies Co.
Controlling Systems
General Electric Co.
Westinghouse Elec. & M. Co.
Converters, Rotary
General Electric Co.
Westinghouse Elec. & M. Co.
Conveying and Hoisting Machinery
Columbia M. W. & M. I. Co.
Copper Wire
Anaconda Copper Mining Co.
Cord Adjusters
Nat'l Vulcanized Fibre Co.
Cord, Bell, Trolley, Register, etc.
Brill Co., The J. G.
Electric Service Supplies Co.
International Register Co., The
Roeblings Sons Co., John A.
Samson Cordage Works
Cord Connectors and Couplers
Electric Service Supplies Co.
Samson Cordage Works
Wood Co., Chas. N.
Couplers, Car
Brill Co., The J. G.
Ohio Brass Co.
Westinghouse Tr. Br. Co.
Cross Arms, (See Brackets)
Crossings
Ramapo Ajax Corp.
Crossing Foundations
International Steel Tie Co.
Crossing Frogs and Switches
Ramapo Ajax Corp.
Wharton, Jr., & Co., Inc., Wm.
Crossings, Manganese
Indianapolis Switch & Frog Co.
Ramapo Ajax Corp.
Crossing Signals. (See, Signals, Crossing)
Crossings, Track. (See Track, Special Work)
Crossings, Trolley
Ohio Brass Co.
Curtains and Curtain Fixtures
Brill Co., The, J. G.
Electric Service Supplies Co.
Morton Mfg. Co.
Cut-Outs
Johns-Pratt Co.
Dealers' Machinery
Electric Equipment Co.
Transit Equipment Co.
Derailing Switches, Tee Rail
Ramapo Ajax Corp.
Destination Signs
Columbia M. W. & M. I. Co.
Creaghead Eng. Co.
Electric Service Supplies Co.
Detective Service
Wiah Service, P. Edward
Door Operating Devices
Consolidated Car Heating Co.
National Pneumatic Co., Inc.
Safety Car Devices Co.
Doors and Door Fixtures
Brill Co., The, J. G.
General Electric Co.
Hale & Kilburn Corp.
Safety Car Devices Co.
Doors, Folding Vestibule
National Pneumatic Co., Inc.
Draft Rigging. (See Couplers)
Drills, Rock
Ingersoll-Rand Co.
Drills, Track
American Steel & Wire Co.
Electric Service Supplies Co.
Ingersoll-Rand Co.
Ohio Brass Co.
Dryers, Sand
Electric Service Supplies Co.
Ears
Ohio Brass Co.
Electric Grinders
Railway Track Work Co.
Electrodes, Carbon
Indianapolis Switch & Frog Co.
Railway Track Work Co.
Electrodes, Steel
Indianapolis Switch & Frog Co.
Railway Track Work Co.
Electrical Wires and Cables
American Elec. Works
Roeblings Sons Co., J. A.
Emergency Kits
First Aid Specialty Co.
Engineers, Consulting, Contracting and Operating
Allison & Co., J. E.
Archbold-Brady Co.
Arnold Co., The
Beeler John A.
Bibbens, J. Rowland
Day & Zimmerman, Inc.
Drum & Co., A. L.
Feustel, Robert M.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Ong, Joe R
Parsons, Klapp, Brinkerhoff & Douglas
Richey, Albert S.
Robinson & Co., Dwight P.
Sanderson & Porter
Shaw, Henry M.
Smith & Co., C. E.
Stone & Webster
Engines, Gas, Oil and Steam
Ingersoll-Rand Co.
Westinghouse Elec. & M. Co.
Expansion Joints, Track
Wharton Jr., & Co., Inc., Wm.
Fare Boxes
Cleveland Fare Box Co.
Economy Elec. Devices Co.
Johnson Fare Box Co.
Nat'l Ry. Appliance Co.
Ohmer Fare Register Co.
Fence
Cambria Steel Co.
Midvale Steel & Ord. Co.
Fences, Woven Wire and Fence Posts
Amer. Steel & Wire Co.
Fenders and Wheel Guards
Brill Co., The J. G.
Cleveland Fare Box Co.
Consolidated Car Fender Co.
Eclipse Railway Supply Co.
Electric Service Sup. Co.
Le Grand, Inc, Nic
Star Brass Works
Fibre and Fibre Tubing
Nat'l Vulcanized Fibre Co.
Westinghouse E. & M. Co.
Field Coils, (See Coils)
First Aid Equipment
First Aid Specialty Co.
Flangeway Guards
Godwin Co., Inc., W. S.
Flaxlinum Insulation
Nat'y Ry. Appliance Co.
Floodlights
Electric Service Sup. Co.
Forgings
Cambria Steel Co
Carnegie Steel Co.
Columbia M. W. & M. I. Co.
Midvale Steel & Ord. Co.
Standard Steel Works Co.
Frogs & Crossings, Tee Rail
Ramapo Ajax Corp.
Frogs, Track. (See Track Work)
Frogs, Trolley
Ohio Brass Co.
Fuses and Fuse Boxes
Columbia M. W. & M. I. Co.
Consolidated Car Heating Co.
General Electric Co.
Westinghouse Elec. & M. Co
Fuses, Cartridge, Non-Refillable
Johns-Pratt Co.
Fuses, Cartridge, Refillable
Johns-Pratt Co.
Fuses, High Voltage
Johns-Pratt Co.
Fuses, Refillable
Columbia M. W. & M. I. Co
General Electric Co.
Gaskets
Power Specialty Co.
Westinghouse Tr. Br. Co.
Gas-Electric Cars
General Electric Co.
Gas Producers
Westinghouse Elec. & M. Co.
Gasolene Torches
Economy Elec. Devices Co.
Gates, Car
Brill Co., The, J. G.
Gear Blanks
Cambria Steel Co.
Carnegie Steel Co.
Midvale Steel & Ord. Co.
Standard Steel Works Co.
Gear Cases
Chillingworth Mfg. Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
Westinghouse Elec. & M. Co.
Gears and Pinions
Ackley Brake & Sup. Corp.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Electric Service Supplies Co.
General Electric Co.
Nat'l Ry. Appliance Co.
Nuttall Co., R. D.
Generating Sets, Gas-Electric
General Electric Co.
Generators
English Electric Co.
General Electric Co.
Westinghouse Elec. & M. Co
Goggles, Safety
Indianapolis Switch & Frog Co.
Gongs (See Bells and Gongs)
Graphite
Morganite Brush Co.
Greases. (See Lubricants)
Grinders and Grinding Supplies
Indianapolis Switch & Frog Co.
Metal & Thermit Corp.
Railway Track-work Co.
Grinders, Portable
Railway Track Work Co.
Grinders, Portable Electric
Railway Track Work Co.
Grinding Blocks and Wheels
Railway Track-work Co.
Seymour Rail Grinder Co., E. P.
Guard Rail Clamps
Ramapo Ajax Corp.
Guard Rails, Tee Rail & Manganese
Ramapo Ajax Corp.
Guards, Trolley
Electric Service Sup. Co.
Ohio Brass Co.
Hammers, Pneumatic
Ingersoll-Rand Co.
Harps, Trolley
Anderson M. Co., A. & J. M.
Bayonet Trolley Harp Co.
Electric Service Sup. Co.
More-Jones Br. & Metal Co.
Nuttall Co., R. D.
Star Brass Works
Thornton Trolley Wheel Co.

"THEY'RE FORGED—NOT CAST THAT'S WHY THEY LAST"

"CLEVELAND ALL COPPER"

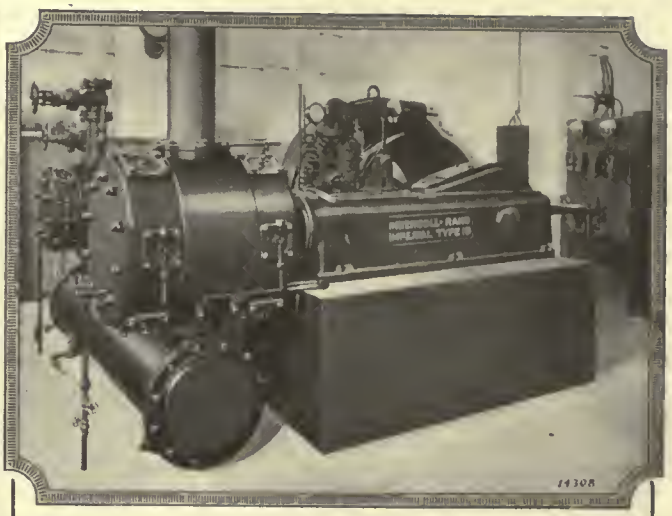
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TROLLEY WHEELS

Take the sting out of the arc and prolong the life of the trolley wire

Send for Particulars

THE COPPER PRODUCTS FORGING CO.
1412 East 47th Street, CLEVELAND





ACKLEY BRAKES
Found The World Over

The No-Staff Brake for any size and type of car

Apply the advantages of the staffless brake with its space-saving features, to all your cars. Ackley No-Staff Brakes are adaptable to any kind of service. The eccentric chain-winding drum insures quickest applications and maximum power.

Price only $32.00

ACKLEY BRAKE & SUPPLY CORPORATION
G S ACKLEY & COMPANY, REPRESENTATIVES
50 Church Street, New York U.S.A.

The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.



THE STAR BRASS WORKS
KALAMAZOO, MICH., U. S. A.

STEEL
'CARNEGIE'

When you think of Steel—think of Carnegie



METER THE ENERGY
that's what you want to save

Then double the saving by inspecting cars on a kilowatt-hour basis instead of mileage or time-basis. Ask for data

ECONOMY ELECTRIC DEVICES COMPANY
L. E. Gould, 37 W. Van Buren St., Chicago

GENERAL AGENT: Lind Aluminum Field Coils
DISTRICT AGENTS: Peter Smith Heaters, Woods Lock Till Fare Boxes, Bemis Truck Specialties, Miller Trolley Shoes.

Compressor Efficiency At Full and Partial Loads

With the 5-Step Clearance Control

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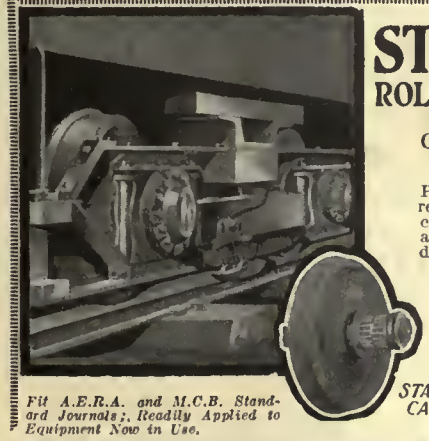
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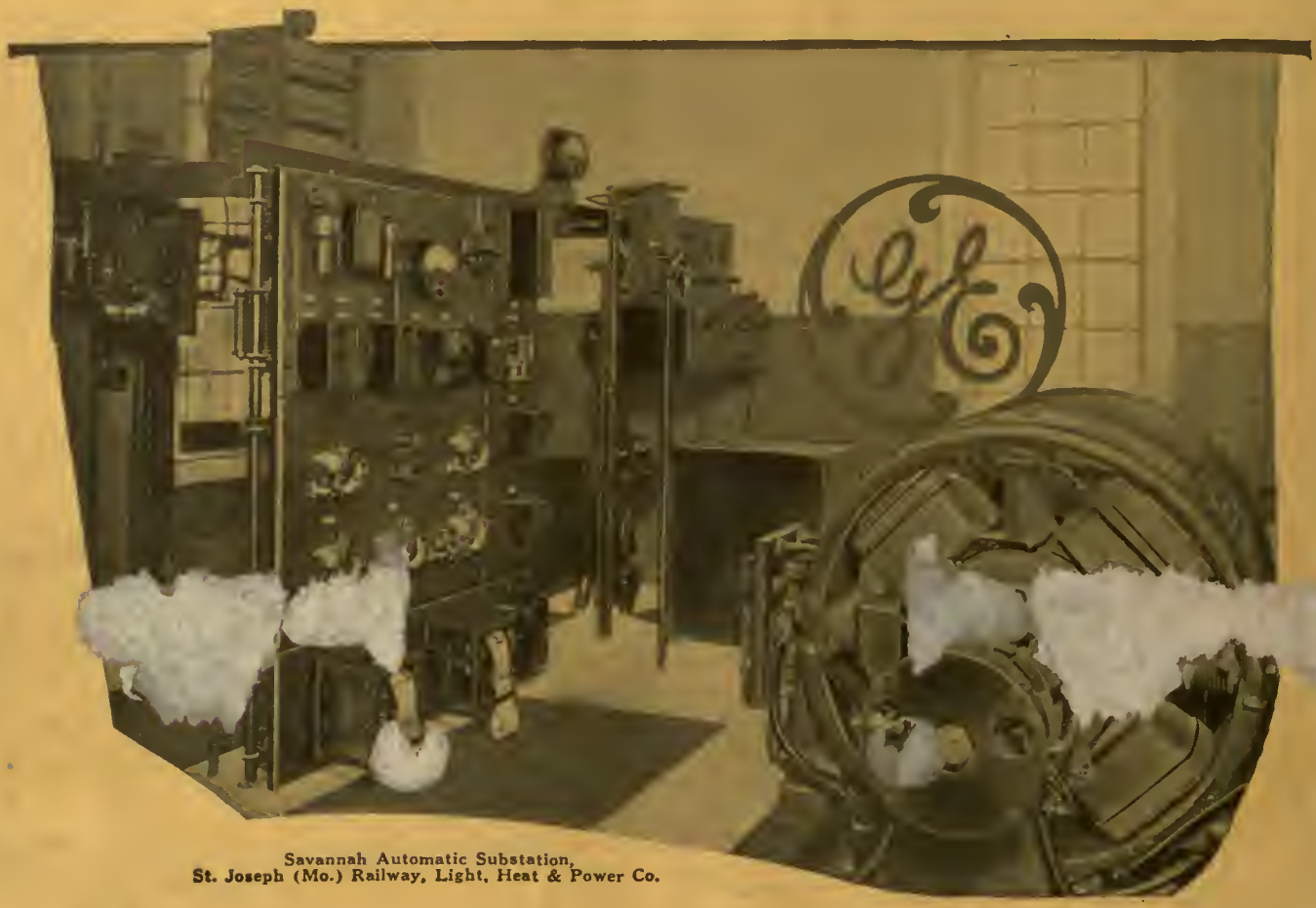
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ELECTRIC RAILWAY JOURNAL



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The Long Island Railroad Electrification









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The reliability, regularity and popularity of electric service as compared to steam suburban service under all conditions, invariably results in increased traffic. To quote an official opinion:

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Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pa.

Westinghouse

Vol. 61, *No.* 10 New York, March 10, 1923 *Pages* 395-434

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What the Subscribers Read

What a Manufacturer Reads

Engineering subjects; personals; trade conditions.—*L. P. M., Manufacturer.*

Looks For New Ideas

Those articles describing methods of construction and maintenance of companies, as we are continually getting new ideas of merit, thereby improving our own methods.

—*B. P. L., Engineer Maintenance of Way.*

Traffic Man Reads All Articles

I find most interesting those articles pertaining to freight and passenger matters, as this is my work. Still I go through the JOURNAL and read every article, as they are all instructive and educational from an electric railway standpoint, irrespective of department. The personal column is also interesting, as I frequently find the name of someone with whom I am intimately acquainted.—*W. J. W., Passenger Traffic Agent.*

Likes the Legal Notes

I find the greater part of the matter contained in the ELECTRIC RAILWAY JOURNAL interesting and derive a very great deal of information from "Legal Notes," as these are especially useful to a claim agent.—*T. N., Claim Agent.*

What a Purchasing Agent Reads

The markets; railway equipment and supplies advertisements; the news columns; in fact, the JOURNAL is beneficial from the front cover to the back cover.—*W. A. B., Purchasing Agent.*

Publicist Finds Paper Helpful

Being in that end of the utility business, naturally I am more interested in articles dealing with public relations. I find the ELECTRIC RAILWAY JOURNAL of value to me in this connection.

—*J. C., Director*
(*of a state committee on public utility information*).

Interested in Selecting Men

Of recent articles will say that those pertaining to equipment and operation of one man cars were of most interest. We are also interested in Mr. M. McCant's article on "Tests Used in Selecting New Men." The importance of this problem is, in my opinion, often underrated. I also like your up-to-the-minute editorials. Your paper so thoroughly covers the electric railway field that there does not seem to be any room for improvement.

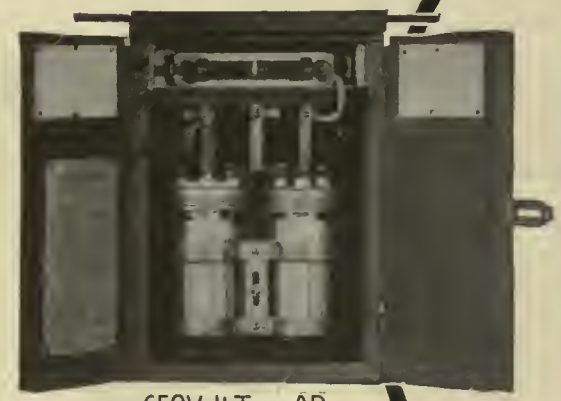
—*J. G. H., Superintendent.*

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For Voltages up to 3800



3800 Volt Type AR
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East Pittsburgh, Pa.

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Hooking the old style trailer on behind a motor car was simply a matter of mechanical coupling—but it was a harder job, and a more dangerous one than making up a modern multiple unit train with its car-to-car air lines and complicated electric circuits.

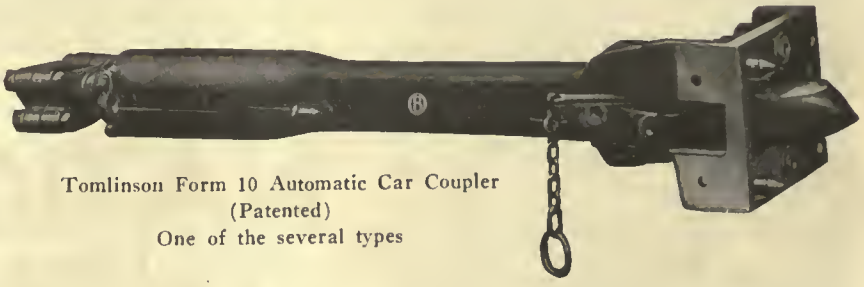
Provided, of course, that the cars have Tomlinson Couplers.

Tomlinson Equipment couples cars, air lines and electric circuits automatically, simultaneously, safely. Electric signal lines, heater circuits, controller connections and power bus may all be part of Tomlinson Coupler Equipment.

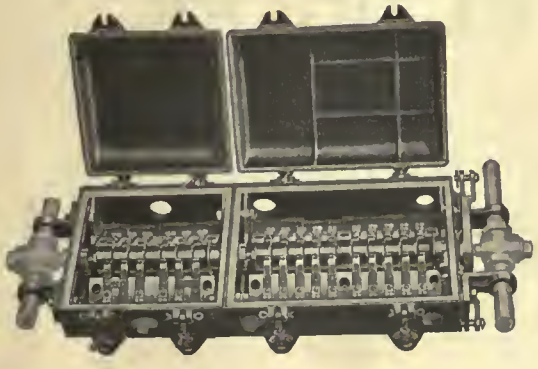
Your mass transportation problem is simplified by Tomlinson Couplers. They are used from coast to coast in interurban and city service—for motor car and trailer operation or multiple unit trains.

Put your coupler problems up to Tomlinson Equipment and O-B Specialists.

From draft gear to draft gear the couplers are a single rigid unit. Mounted radially and with a Tomlinson Spring Draw Bar Carrier the coupler easily takes care of the sharpest of grade changes and the shortest of curves.



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(Patented)
One of the several types



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Need Not Be Expensive
Less Material Excavation and Labor with Steel Twin Ties

Steel Twin Tie Construction has lowered the first and final cost of paved track.

The utilization of the concrete formerly wasted between and below wooden ties has in every case effected a large saving in construction materials. And this saving is at no sacrifice in quality because more effective bearing is provided, both on the concrete, and the subgrade than with wooden ties while the steel cross members serve to reinforce the foundation concrete.

Write for the folder *"Costs, Methods and Best Practice in Steel Tie Construction"* and delivered prices at your material yard.

The International Steel Tie Company
Cleveland



Carry an Ajax Portable Electric Arc Welder

SPECIFICATIONS

Weight—only 155 lbs.

Dimensions—18 in. x 28 in. x 36 in.

Capacity—333 amps. at 600 volts.
—200 amps. at 300 volts.

Control—Switchboard attached.

Equipment—Electrode Holders.
—Trolley Pole.
—Cables.
—Face Shield.
—Canvas Cover.

Write for circular and prices

It will pay you well to carry one or more of these sturdy little machines in your track department equipment. Light, rugged, easy to operate, inexpensive to maintain, the Ajax Electric Arc Welder is the most practical instrument ever devised for the maintenance of electric railway track. Its extremely high capacity at all operating voltages makes it especially valuable for accomplishing strong, deeply-penetrating welds under all conditions.

Strengthen Your Track Department

with

Universal Rotary Track Grinders
Atlas Rail Grinders
Reciprocating Track Grinders

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The Keystone trade mark has meant for years all that is best in the way of electrical equipment and car specialties. When you specify any product bearing this special Keystone design you can rest assured you are ordering something that passed the experimental stage years back.

Some of the Car Specialties sold under the Keystone name are listed in the panel. You will find some of them on nearly every car operated today. You will find all of them on many cars. You, too, should be using all of them. Maybe you would like the complete set of data sheets. How shall we address them?

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- Faraday Car Signals
- Safety Lighting Fixtures
- Golden Glow Headlights
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- Keystone Cord Connectors
- Keystone Trailer Connectors
- Automatic Door Signals
- Standard Trolley Harps
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- Keystone Trolley Line Material
- Locke High Voltage Insulators
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- Segur Coil Winding Tools
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- Garton-Daniels Arresters



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ORDERS FOR

Portland (Ore.) Railway, Light & Power Company will spend $5,000,000 in 1923 in improvements and extensions to its properties. About half of the sum will be applied toward construction of the great hydro-electric power generating plant on the Oak Grove tributary of the Clackamas River. Franklin T. Griffith, president of the company, who recently returned from the East, has made this announcement.

Springfield (Mass.) Street Railway, through President Wood, has announced its intention of buying ten or twelve cars of a large two-man type similar to those in use on the Boston Elevated lines. Each of these cars will carry fifty persons seated. No new open cars or one-man cars will be bought. About $150,000 will be invested in the new equipment.

Tri-City Railway & Light Company, Davenport, Iowa, will install a new generator and a 35,000-hp. steam turbine and new boilers and auxiliary equipment will constitute part of the $1,250,000 improvement program.

Morris County Traction Company, Morristown, N. J., is arranging to install an automatic block signal system on its lines which run from Lake Hopatcong to Maplewood and Elizabeth.

Citizens Traction Company, Oil C Pa., has ordered six new cars fo in Franklin and Oil City. They of a type similar to the Birne cars now in service.

South Covington & C Railway, Cincinnati, O ket for 100 tons of of T-rails.

Pacific Northwest Traction Company, Seattle, Wash., will expend approximately $150,000 in rebuilding the waterfront trestle, 4½ miles long, used by the interurban between Bellingham and Blanchard. Three million feet of timber and 20,000 ties will be needed for the improvement. The material will be purchased locally.

Georgia Railway & Power Company, Atlanta, Ga., is now building its new Moreland Avenue substation, which is to be finished by September. The cost is estimated at $150,000.

Pennsylvania-Ohio Electric Company, Youngstown, Ohio, is considering the purchase of ten or twelve cars, for use on one of its interurban lines, which will be as elaborately equipped and finished as a limousine.

Philadelphia (Pa.) Rapid Transit Company has ordered 576 new cars, costing approximately $6,500,000. Of the car order, 520 cars will be of the regular passenger type, thirty-four snow plows and sweepers, twenty construction and supply cars, one crane car for subway (elevated operation) and one crane car for surface operation.

Northwestern Elevated Railroad, Chicago, Ill., recently installed in its Wilson Avenue shop, a new 400-ton wheel press manufactured by the Niles-Bement-Pond Company.

Chicago Surface Lines has ordered 250 Johnson hand-operated fare boxes. These are in addition to the 270 that are already installed.

The buying has begun

You can keep —if you keep

Big Orders Pending

A few recent items are shown above. There is a quickening flow of them. Since January 1, reports show that orders for 1106 cars will be placed at once. A car builder reports a 550% increase in business over last year's to date. A tie manufacturer reports a 700% increase. Similar signs of progress come from all classes of manufacturers. Progress reports come from everywhere.

Get your full share of the prosperity

Electric Railway Journal, Tenth

Washington Railway & Electric Company, Washington, D. C., recently ordered ten more one-man cars. This makes a total of forty that will be added to the company's rolling stock during 1923. Some time ago an order was placed for thirty new cars of the most modern, pay-within type to be delivered early during this year.

Los Angeles (Calif.) Railway will soon start the reconstruction of East Ninth Street between Mateo Street and Santa Fé Avenue line. This improvement involves 700 ft. of work in which new girder rail will be installed.

Georgia Railway & Power Company, Atlanta, Ga., will shortly add twenty cars to its equipment.

United Electric Railways, Providence, R. I., has purchased 900 of a new type of Rooke register from the Rooke Automatic Register Company which will take nickels, dimes, quarters and metal tokens. The railway has standardized on this type of fare collecting device and is using it on all its cars, both pay-enter and pay-leave, as well as on the

Springfield (Mass.) Street Railway and Worcester Consolidated Street Railway have purchased two escalator snow removers costing about $3,000 each. This device built on a caterpillar tractor is expected to lighten the financial burden of snow removal. They were built at Aurora, Ill.

Charlottesville & Albemarle Railway, Charlottesville, Va., has installed and put in operation its new 1,500-kw. G. E. turbine. The company will now purchase and install one 750-hp. 225-lb. working pressure boiler with stoker.

Chicago Surface Lines has just placed orders for 100 motor passenger cars of the same type as the sixty-nine that are now under construction in its shops for hauling trailers. J. G. Brill Company will furnish seventy bodies and all the trucks and the remaining thirty bodies will be built by the McGuire-Cummings Company. Each car will be equipped with four G. E. 275 motors.

San Francisco-Oakland Terminal Railways, San Francisco, Calif., has ordered for the Key Route system from American Car Company fifty-five double truck cars to be delivered in four to five months and to cost delivered approximately $14,700 each.

Potomac Public Service Company, Frederick, Md., is making rapid progress in the erection of the $2,000,000 electric power plant which is being built along the Potomac River at Williamsport, Md.

Chicago, North Shore & Milwaukee Railroad, Highwood, Ill., has placed an order with the General American Car Company, Chicago, for fifteen gondolas, and with the Standard Steel Car Company, for twenty drop bottom cars.

Puget Sound Power & Light Company, Bellingham, Wash., announces that it will rebuild its South Elk Street racks and repave between them this , at a cost of approximately $60.000.

n (N. Y.) City Railroad is in for 500 new double-truck

& Cincinnati (Ohio) to spend $300,000 new tracks on in Covington,

—YOU?

The buying will continue

selling them telling them

Big Customers Waiting

for light on the equipment, materials and supplies that best meet their needs. They read their *Electric Railway Journal* every week. Keep telling them every week what you can do for them. Keep telling them and you will keep selling them. The increase in sales recorded by many advertisers are possible also for you. Keep your message in the Journal and get your share.

Make your space show what you think of your product

Avenue at 36th Street, New York







"Advice" from the Bleachers

TWENTY thousand roaring fans tell the pitcher just what to do. But unmoved by the clamor, he does what he knows to be right. Possibly he wonders if any of those fans have ever stood on the mound and faced Babe Ruth.

It's easy to give advice, but advice is usually only valuable when it comes from a man who has been through the mill.

Now, then, to get down to your business. When a man offers you advice on the operation of Rolling Stock or Power Plants, you have the right to ask him this question;

Where did *you* learn your trade?

The Texaco Lubrication Engineer who calls on you would be glad to have you ask him.

For Texaco Lubrication Engineers are not swivel chair engineers. They are at home in overalls.

They know their business in the practical sense.

When they tell you to use a certain Texaco Lubricant for a certain purpose, they *know* that it will work right.

They have watched it work time and time again, not from the side lines, but right alongside the man in overalls, whose job it is to keep the equipment running at the maximum capacity for the least cost.

TEXACO recommendations are sound

They are made by men who have their feet on the ground.

Ask us for a practical solution of any problem—all roads have them once in a while—and see for yourself how quickly Texaco Service and Texaco Lubricants will banish the trouble.

There is a Texaco Lubricant for every purpose, rolling stock, power plant, substations everywhere,

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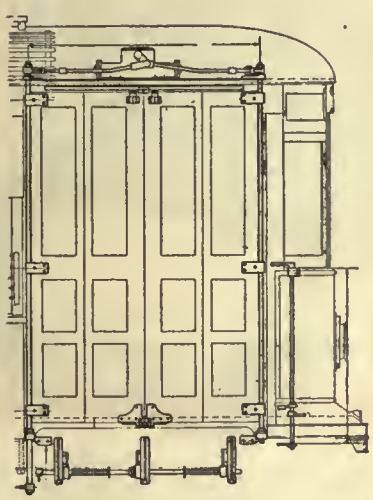
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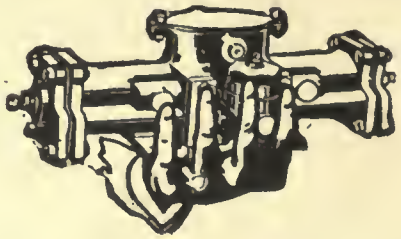
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ELECTRIC RAILWAY JOURNAL

Consolidation of Street Railway Journal and Electric Railway Review

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The Personal Touch Is Necessary in Maintaining Friendly Public Relations

THE present interest in fostering good relations between the public utility and its public is excellent. Wherever such relations can be fostered on a sound basis, no effort to develop them is wasted. But to be successful the effort must be based upon a few fundamental facts. Otherwise the relations will fall like the house built upon the sand when the storm comes. The manager ambitious to keep his property right with its patrons must have high ideals of the mission of the property to the community, must understand the individual and social characteristics of his patrons and must know how to convince his community that he and the utility which he administers are there to serve it first and make a profit second. In no other ways can he keep from getting in wrong, and once in he will find it hard to get out. A tough proposition? Yes, it takes a real man to solve it. But it can be solved.

The public which supplies the patronage for an electric railway is something individually personal, not a mass of humanity. These individuals, therefore, must be reached as such. They do, of course, think in groups and even then many think very little, but unless they are visualized as separate entities, "public relations" will not get very far.

The manager must, therefore, be a "mixer," using that overworked word in its best sense of a friendly man. The public relations matter must begin at the head, it is something that cannot be delegated. The manager personifies the railway to the patrons. They must like and respect him or he cannot properly serve them. Good public relations cannot be made by machinery, no matter how ingeniously devised, for machinery has no heart.

Service Must Come Ahead of Profits in Promoting Good Public Relations

OBVIOUSLY, then, good public relations are friendly relations, but they must be based on what really interests the people—good service. No amount of handshaking and captivating talk will take the place of it. Better keep mum and in the background until the service is as good as it can be made. When good service is being supplied it is worth talking about. In doing this some simple rules can be followed, although, people being as they are, no complete technique of good public relations will ever be developed. The following appear to be sound:

Let the manager put service ahead of profits in his mind as well as in his words. Profit will follow.

Let the manager and his entire staff be as integral a part of the community socially as their service is an intimate part of its life.

Let the manager mellow his intelligence in putting a message across with sympathy for the public point of view, without necessarily saying or feeling that the public is always right.

Let the aim be to reach the public as individuals, man to man, utilizing so far as possible the natural channels of leadership through which the general run of people are accustomed to receiving their impressions.

Many companies have men who are vested with the particular task of promoting good public relations. Where do they come in if this is a kind of work which cannot be delegated by the management? When a company can afford a specialist along these lines, well and good. But he must do his work as an auxiliary and not as the principal representative of the company before the public. Otherwise he would put the management in the shade as far as the public is concerned, and render it in effect and to this extent supernumerary. There is plenty of study and planning for a specialist where the manager has the right idea on this subject.

A Place for College Men in the Transportation Department

THERE is no great difficulty to interest young engineers coming out of college in a job in the power house of an electric railway. The power house seems to appeal to the training these men have had in a way that no other place in the organization does. Some can be interested in jobs in the mechanical and way and structures departments. But practically none seem to visualize any opportunity in the transportation department. They are willing and happy to don overalls and get into the grease of the power plant, but seem unwilling to start with a clerical job at a division headquarters and learn that phase of the business.

The opportunity here is something that colleges can well bring to the attention of student engineers. The transportation department of the electric railway offers real opportunity for a man to grow for several reasons. In the first place, there is probably greater room for improvement of the calibre of men now in the transportation positions than is true of any other department. Generally speaking, the men holding the positions of division superintendents and their assistants are men who have come up from the ranks and who have learned to handle men. But they are often hard taskmasters and have little vision beyond the existing methods and routine. A young engineer with energy and initiative, and trained to think and analyze, would thus step into an almost virgin field in many companies upon taking a place in the transportation department. Of course, he must expect to start at the bottom and spend perhaps two or three years in hard subordinate positions while gaining a thorough grounding.

That there is need for something more than a boss of men hardly needs argument. The transportation department employee who develops the genius to fit schedules to traffic, so that there shall be the minimum of unprofitable mileage, but the maximum profitable use of equipment, and then, as a boss, can turn his trainmen and inspectors into a truly merchandising organization, can name his own salary.

The transportation department spends some 60 per cent of the total operating expenditures and yet it is probably the poorest manned of all departments. It is also the poorest paid of all departments, referring to the salaried positions. But this is an outgrowth of the fact that these men are from the ranks and they have not required as much money, though this is wrong. Had the salaries paid in this department been adequate to attract and hold better men, the transportation department would probably be a better functioning machine than it is today, generally speaking. At any rate, there is great opportunity for improvement and managements would do well to endeavor to bring some new blood into this department and give it a chance to grow. For the young college men, this department would be no bed of roses, but the chance for real accomplishment there is so great that it may be quite sound to say that the young engineer will find his ability rewarded more quickly here than in strictly engineering pursuits, where the need for improvement is much less apparent.

Is a Merit and Demerit System for Utility Service Possible?

CAN utilities be graded as to their service performance to determine which are living up to their capabilities. The public service commissions of at least two states think that they can. As yet, there is no report that a service standard has been drafted for electric railway companies, but if the grading system can be applied to gas, electric light and telephone companies, it may be possible later to include the railways. The system as used in Wisconsin was described at a meeting of the commission engineers in Washington last week, and it is reported that the Illinois commission also has a somewhat similar schedule.

Mr. Hayden of the Wisconsin commission was very careful to explain that the system as applied to the utility companies was not drafted with the thought that they should be graded like schoolboys, with some receiving honor marks and others being conditioned and perhaps failing finally to graduate. Nevertheless, it is obvious that such a merit and demerit system has many possibilities for good, if justly administered.

Of course, allowances would have to be made for the conditions under which the service had to be given. One should not expect metropolitan service in a small community. Nevertheless, one of the handicaps of many railways has been that there has been no real standard against which their service can be judged. When a chronic grumbler or a demagogue for political effect says that the service is poor compared with what it ought to be, no reply is possible. But it would be different if the company could declare that its service has been classified on a recognized definite standard in comparison with other like properties and had been found to be "Grade A." It may be also that such a system of grading, as has been pointed out by Mr. Nash of Stone & Webster, will provide a basis for that financial "incentive" which many think necessary in service-at-cost franchises.

Holding Company Investors Carry Reorganization Load

FAST on the heels of the announcement of the completion of the plans for the readjustment of the financial affairs of the Interborough Rapid Transit Company, New York, has come the publication of the terms of the proposed reorganization of the Brooklyn Rapid Transit Company under foreclosure. As has been detailed before, the underlying bonds of the companies making up the Brooklyn Rapid Transit system will remain undisturbed. The principal obligation to be adjusted is the company's own $57,243,700 of three-year 7 per cent notes due in 1921 on which $20,035,295 in interest will have accumulated by July 1 next. In the place of this $77,278,995 of principal and interest there will be issued $62,968,070 of new 6 per cent bonds and $10,303,866 of 6 per cent preferred stock with $4,007,059 to be paid to the holders in cash. As for the tort creditors, about whom such a fuss was made in the newspapers following the terrible Malbone Street accident, they are to be paid in full. These claims for personal injuries are estimated at $2,200,000. Holders of general contract claims aggregating $1,500,000 with $400,000 of unpaid interest to July 1, 1923, will receive $1,150,000 in the new preferred stock and $750,000 in cash according to the plan proposed. As for the stockholders, they must pay an assessment of $35 a share.

The net result of the reorganization will increase the funded debt to $139,210,135, or more than $10,000,000, with an estimated annual interest charge of $6,679,528. This, it is said, is slightly less than the amount paid on this account before the receivership, but a fair comparison is not possible because the reorganization plan is subject to some revision and because the last report made by the company previous to the receivership did not differentiate between taxes and fixed charges. Offhand, it would seem that the charge of $1,500,000 per annum on the issue of $25,000,000 of new 6 per cent preferred stock accumulative after three years must necessarily work to the material detriment of the holder of the common issue. As a matter of fact the holders of the common stock will, under the reorganization, be assured of a small immediate income, for they will receive for the assessment 62½ per cent in new sinking fund 6 per cent bonds, while for the balance of the assessment they will receive preferred stock. Moreover, the chance is good for immediate appreciation in the value of the common share holdings, which will be exchanged share for share. On the basis of the earnings of the company for the year ended June 30, 1922, it has been estimated that the dividend on the preferred stock is being earned 2.84 times, with 3.5 per cent left for the common.

As Judge Mayer explained, it was a very difficult job to reconcile the representatives of the various security holders to a workable plan not too onerous in its terms to any of the holders. All that remains to be done now is to work out the details inherent in every important plan of reorganization and then to present the plan to the Transit Commission. It is interesting to note that whereas in the Interborough Rapid Transit readjustment that company divested itself of the surface lines in New York and Queens to devote itself to the intensive development of the rapid transit lines, the Brooklyn reorganization contemplates the possible future reacquisition of the Brooklyn City Railroad, now restored to a good degree of prosperity and a dividend-paying basis.

Rerouting Would Save Money in Richmond

By Rerouting and Other Service Changes Requiring a Very Slight Capital Expenditure for Special Trackwork Only, a Saving of More than $250,000 Annually Is Possible—Principles of Rerouting Are Laid Down—Other Economies Are Suggested

THE report on the Richmond railway property for the City Council of Richmond, Va., being made by John A. Beeler of New York, concludes with a suggested rerouting plan. Briefly, it declares that without the addition of any new equipment or the building of any new lines or tracks except a few minor connections more than $250,000 can be saved annually by the plan proposed.

Previous abstracts of sections of this report have been published as they have been made public by the Council and have appeared in the issues of this paper for Dec. 9, 1922; Jan. 27 and Feb. 10, 1923. Briefly their contents may be summarized as follows:

First, the cost to reproduce the property as it exists today and the company's actual cumulated investment from the date of its organization to the present time are given.

The status of the securities issued is then treated in detail, with their proper allocation to the Richmond railway division.

Then the report describes the financial methods and practices of the railway from its organization to the present, with a statement of the service rendered, the expenses and taxes in detail by years from 1911 to date. The income and outgo are analyzed, and the rate of return ascertained for each year.

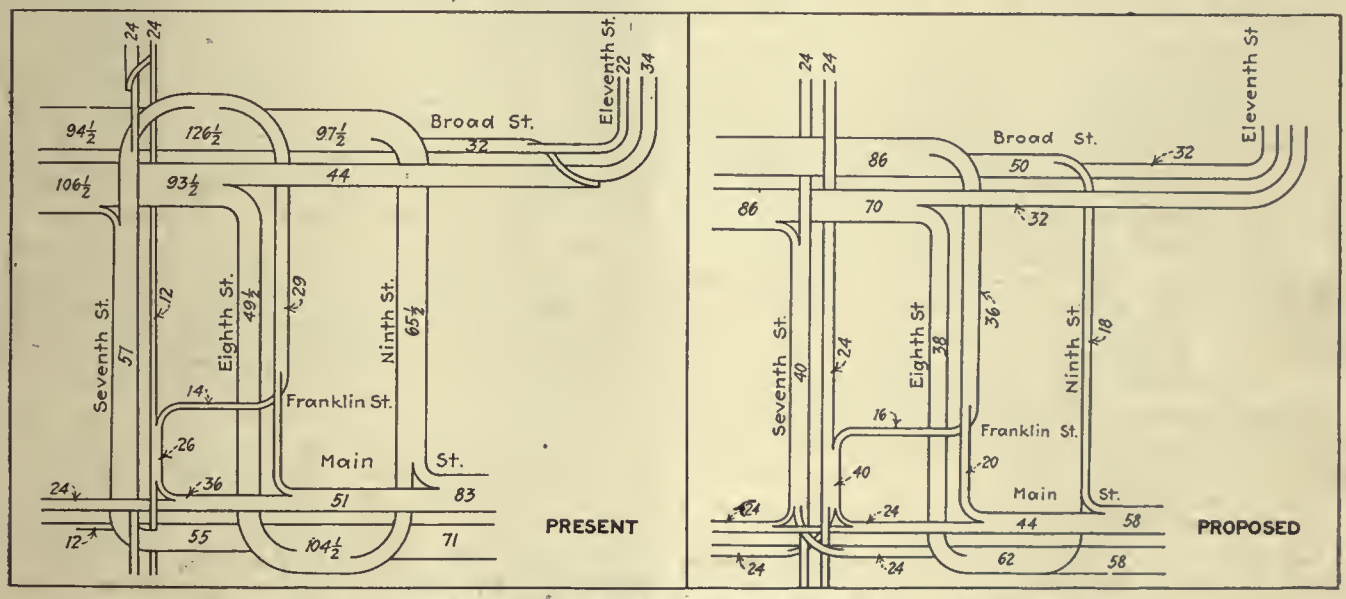
Next a survey of the passenger and traffic movement is presented, showing that the present movement has long been obsolete. A new routing plan is proposed, which will lessen congestion in the downtown section and provide quicker, more direct and better service. By this, with the improved operating method suggested, the saving already mentioned may be expected.

It is believed that with these changes a fair return on a fair valuation will be immediately available.

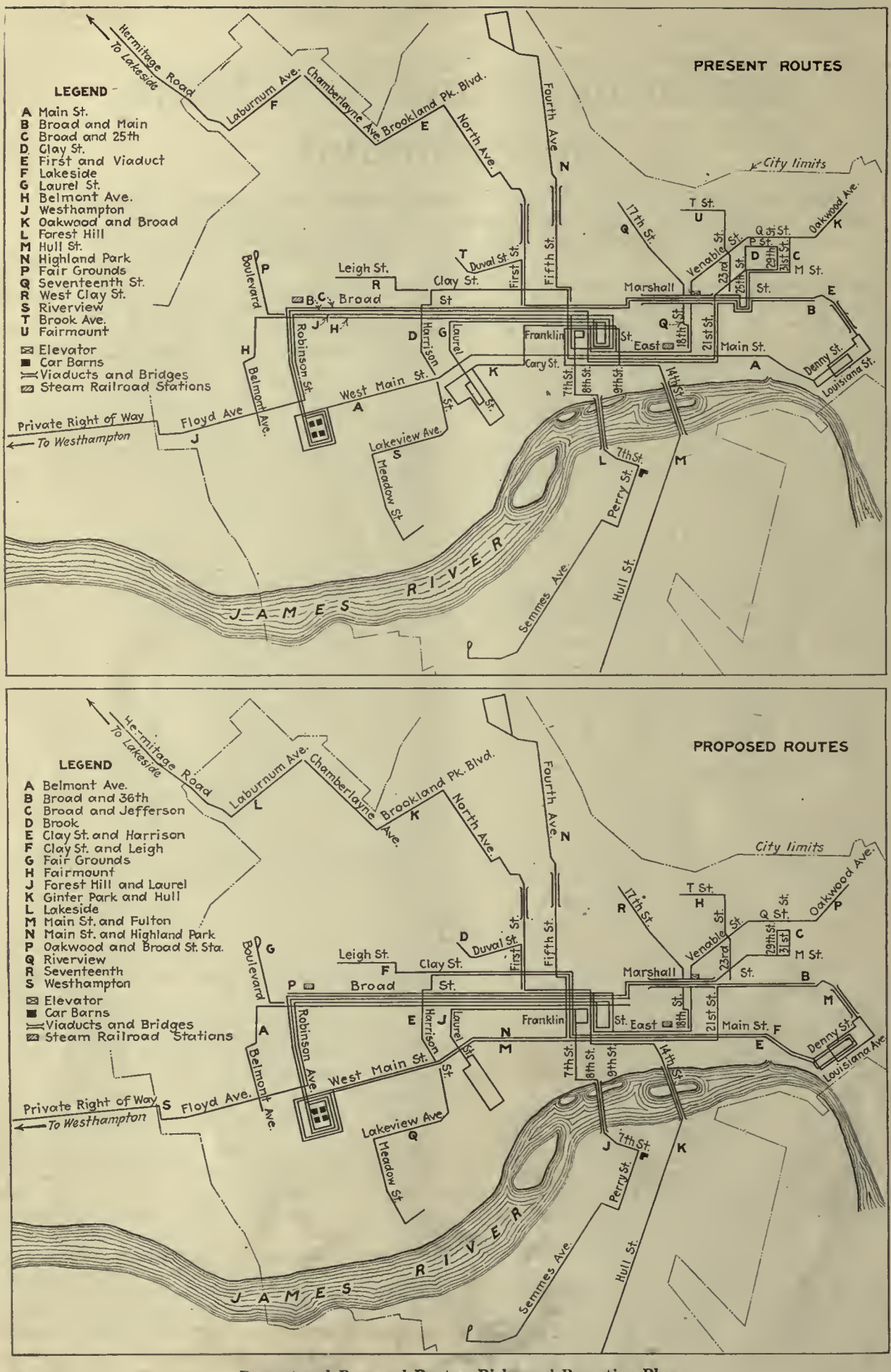
Routing and Service

In this final section of his report Mr. Beeler not only outlines a system of rerouting for the Richmond lines but lays down a set of principles of routing and service. Routing, he says, is a vital factor in the successful operation of a street railway property. It should be watched continually. A routing correct today may not be suitable a year hence. Cars should be so routed as to serve best the riding public by carrying them where they want to go directly, quickly and economically. To transport passengers economically, the car service must be adjusted to the traffic demands, and to carry them quickly the routing must be such as to avoid traffic congestion.

Usually the demand confronting a street railway is for transportation between the manufacturing or business sections of a city and the residence districts. Two methods have been developed, namely, loop routing, where the cars loop in the business section and return, and through routing, where cars operate from one side of the city through the downtown section to another district. Some cities adopt one plan and some the other. In Richmond, a combination of the two is found. The best solution depends on the riding characteristics. If the demands for service in two different districts are about the same, through routing is the better, as it



Downtown Car Flow Charts Under Present and Proposed Routing. The Figures Indicate Cars Scheduled in Maximum Hour, 5 to 6 P.M.



Present and Proposed Routes, Richmond Rerouting Plan

eliminates loop mileage, usually unproductive, and reduces turning movements in the business section, where congestion is most acute. On the other hand, if the demands are not approximately the same, loop routing may be preferable, because if through routing were used either one section would be under-serviced at the expense of the other or more cars would be run lightly loaded in the first.

Short-lining, or turning back a part of the service at some intermediate point instead of running it all to the end of the line, should always be considered in any routing plan. This not only promotes more efficient operation but it distributes the service more justly.

Before recommendations for improving transportation in the city of Richmond were formulated it was necessary to obtain and digest a large amount of material with regard to the operation of the cars at all times of day, as well as movements of people and vehicles, and traffic conditions generally throughout the city. The company co-operated by furnishing schedules of all lines, route maps and much other valuable information.

To study car loading and operating conditions of individual lines, more than 100 trips covering all routes were made by trained observers and carefully analyzed. The records of these trips show the actual observed running time of the car over the various sections of the route, the locations where stops were made, the passenger interchange at each, and the delays and their causes. These rides were made at all periods of the day, special attention being given to obtain average rush-hour and non-rush conditions. Charts were made to show graphically the information obtained, so as to have them available for study of the individual conditions of each route. A typical one is reproduced.

A series of traffic counts was made to show the total demands for service at the principal controlling points in the city. The counts show the total number of riders passing these points for all periods of the day from 6 a.m. until midnight. The passenger loads were tabulated by fifteen-minute periods in the rush hours, and by thirty-minute periods in the non-rush. Charts similar to that reproduced were then prepared to show similar information in graphical form. Special observations were taken of traffic at congested points in the business district and during the rush hours at selected locations where conditions were bad.

Layout of the City

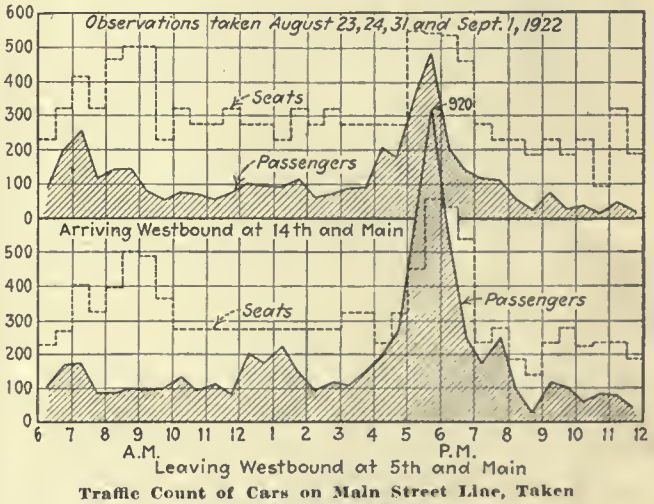
The city of Richmond has a rather rugged topography. It is divided into two main portions by the James River, which runs near the center of the city. The northern section is divided further by Shockoe Creek, which runs in a deep valley between the hill on which the business district is built and the residential sections to the north and east. Several industries requiring transportation facilities are located in this valley. The separation of the city into districts by this topography has necessitated the construction of several bridges and viaducts. Naturally the distances to be covered are fairly great, causing a decided increase in demands on the transportation system.

Service is now given by eighteen routes regularly operated in the base hours, supplemented by various "tripper" cars for the rush. On the average weekday some 134 cars are in operation in the base. During the rush periods this service is built up to 182 cars in the morning and 195 in the evening. The passenger averages show that there are more than enough seats furnished everywhere in the city at all periods of the day. Even in the rush periods from 6 to 9 a.m. and 4 to 7 p.m. there is no place where the total passengers exceed the total seating capacity. Nevertheless, if the cars do not come at the right time, there may be more than enough seats furnished in any given period and yet passengers may be obliged to stand. Irregular loading and spacing are characteristic of the Richmond service.

Present and Proposed Routing

The eighteen routes forming the major service in Richmond were laid out more as a result of competition than with regard to the present needs of the residents they serve. There is much duplication, and many lines are indirect and inefficient. The present and proposed routes are shown on the accompanying maps, which are not drawn to scale.

In the new routing much of the duplication mentioned is eliminated, and the routes are more direct. It will be easier to build up the rush-hour service. Congestion in the business district will be reduced, especially in the peak hours, so that all car, vehicle and pedestrian move-



Traffic Count of Cars on Main Street Line, Taken by Fixed Observer

This is a through east and west line, and westbound cars are charted in both of these cases.

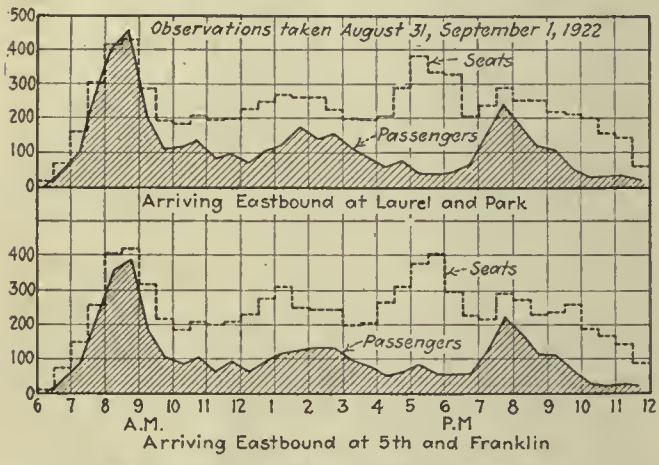
ments will be speeded up. The time required for a patron to reach his destination should be reduced, and in many instances the headways will be improved materially.

A comparison of these routes shows that those proposed are more direct than at present. The arrangement is such as to accommodate the riding public as well as may be with the limitations of track and topography. More through routes are provided, thus increasing the delivery area for such lines and decreasing the amount of transferring. Of the transfers that may be necessary under the new routing, more are made outside the downtown district, so that this source of congestion will be lessened. Fewer cars also are turned back in the heart of the city. This will reduce the congestion. It also will better serve the stores in this district and beyond, since more of the patrons will be able to take their cars without a walk to some point removed a considerable distance.

The plan will commend itself in the rush hours especially. The traffic graphs reproduced show the present and proposed number of cars scheduled in the maximum evening hour, between 5 and 6 o'clock. At present the worst points on the system are on Broad between

Seventh and Eighth, and on Main between Eighth and Ninth. The trouble is due to the large number of cars looping in these squares. With the rerouting this source of congestion will be reduced materially. The present operation is further complicated by the cross-over movements at Seventh and Broad and Eleventh and Broad. With the new routing these movements will not be made in the rush hours, the cars going straight through. All left-hand turns at Seventh and Broad will be eliminated, while similar turns at Ninth and Broad will be reduced to less than a third the number now made.

On Main Street conditions will be improved about equally. All the left-hand turns at Ninth and Main,



Traffic Count of Jitneys on Jitney Route No. 1

This route serves the "fan-shaped" residential district in the western part of the city, 3,000 ft. wide at its widest part, now without direct car lines going downtown. Both charts show inbound traffic. The point of observation in the upper chart is part way "downtown." The observations in the lower chart are in the business district. The charts show much unused jitney service.

except those made by the Westhampton cars, will be eliminated. At Seventh and Main the left-hand turns will be reduced from forty-three to twenty-four.

The total turning movements scheduled at present are 402. With the proposed routing they will be reduced to 264. The gain is largely in the reduction of left-hand turns, as will be seen from the detailed figures. A comparison of totals follows:

	Car Movements		Reduction	
	Present	Proposed	Number	Per Cent
Number of left-hand turns	266½	136	130½	49.0
Number of right-hand turns....	135½	128	7½	5.5
Total turning movements	402	264	138	34.4

It is generally conceded that the left-hand turn is much more difficult and conducive to congestion than the right-hand turn. In this case, while the total turns proposed are one-third less than at present, the number of left-hand turns proposed has been reduced nearly 50 per cent. Another improvement is that the number of cars scheduled in opposing directions on a street is more nearly equal. This is desirable as two streams of cars can be moved through an intersection almost as quickly as one. With the rerouting in effect the total congestion from car movements in the downtown section will be reduced more than a third. All movements, both car and vehicular, will be accelerated. The other recommendations for the relief of traffic congestion should assist still further.

Due to the economies recommended it is possible to handle the business with somewhat fewer cars than now in use. Each car will make more mileage and provide more service than with the existing methods. The safety cars will be used to best advantage, thus improving the service for a larger share of the public.

Extensions

Due to conditions of unbridled competition existing when the present street car lines were begun too much track was constructed for the best interests of the public. Since that time the city has grown very greatly. The development, to a great extent, has been along the street car lines, but even so there are certain lines which have not earned as yet, nor are likely to earn in the near future, enough to justify their existence apart from the general good to the city.

In planning new lines it is desirable to consider all the factors likely to influence city growth, so that the mistakes of the past may not be repeated in the light of more experience.

The Jitney Situation

As in many other cities, competition to the street cars sprang up a few years ago in the form of "jitneys," principally Ford touring cars, carrying passengers for a 5-cent fare directly along the street railway routes. The operation of these jitneys was conducted in an irresponsible manner, and traffic congestion increased to the point where all vehicle movements were affected adversely. The situation finally became so serious that the city was forced to adopt regulatory measures. During the past summer an ordinance was adopted, among other things licensing the drivers, fixing the fare at 8 cents, and providing for indemnity insurance. Operation was restricted to five regular routes, covering a large portion of the city. This ordinance has clarified the situation and has brought the operation of jitneys within the supervision of the city authorities. Up to the present time but one of the routes has been operated regularly. This is known officially as "Route No. 1," and runs through the "fan-shaped district" in the West End section of the city.

A special investigation of the jitney traffic was made in accordance with the request of the Council committee. The data are charted in an accompanying diagram. In the eighteen hours covered by the check the jitneys on this one route carried 4,017 passengers westbound and 4,309 eastbound, as determined at the maximum point, Laurel Street. This compares with 12,454 carried westward and 13,131 carried eastward on the Broad Street cars, and 6,419 westbound and 6,152 eastbound passengers on the Main Street cars.

The maximum number of jitneys observed was fifty-six in one fifteen-minute period. This is at the rate of nearly four per minute, and represents almost the limit from the standpoint of congestion. While the headways were very close, the advantage to the individual was not equally great, as the usual allowance per jitney is four passengers, and frequently prospective passengers have to wait considerable periods before they can obtain transportation by this method.

To carry this business ninety-nine machines actually were in operation at some time during the day of the counts. Presumably at the very least ninety-nine men were engaged in the business of operating these cars.

Equal or better service could have been offered by the street railway with some twelve safety cars, with not more than twenty-four men as operators for the entire eighteen hours. This would furnish the same

number of seats throughout the day as the jitneys had during the rush hours, or nearly twice as many as were running in the non-rush hours.

Jitney service costs considerably more to operate than equivalent street car service. This has been proved many times and under widely varying conditions. The reason the business survives is because any individual may engage in it and be satisfied with day wages. In fact, some persons will run their machines a few hours each day in addition to some other line of work. The jitneys as at present operated, even with the excellent provisions of the ordinance now in force, do not have anything like the safeguards required of a responsible corporation, either with respect to service or damages. There is no way of collecting damages beyond the amount of the insurance, though several people may be involved in an accident. Neither is the public assured of adequate service, as there is no method by which the jitney operator may be forced to run his machine, or by which individuals may be obliged to engage in the jitney business.

Up to date the jitneys have not been taxed nearly as heavily as the corporations, nor have they been obliged to assist in paying for paving and its maintenance. The street railway pays taxes equivalent to nearly 10 per cent of the gross receipts and, in addition, installs and maintains a considerable portion of the paving on streets where it operates.

Estimated Savings of Proposed Car Service

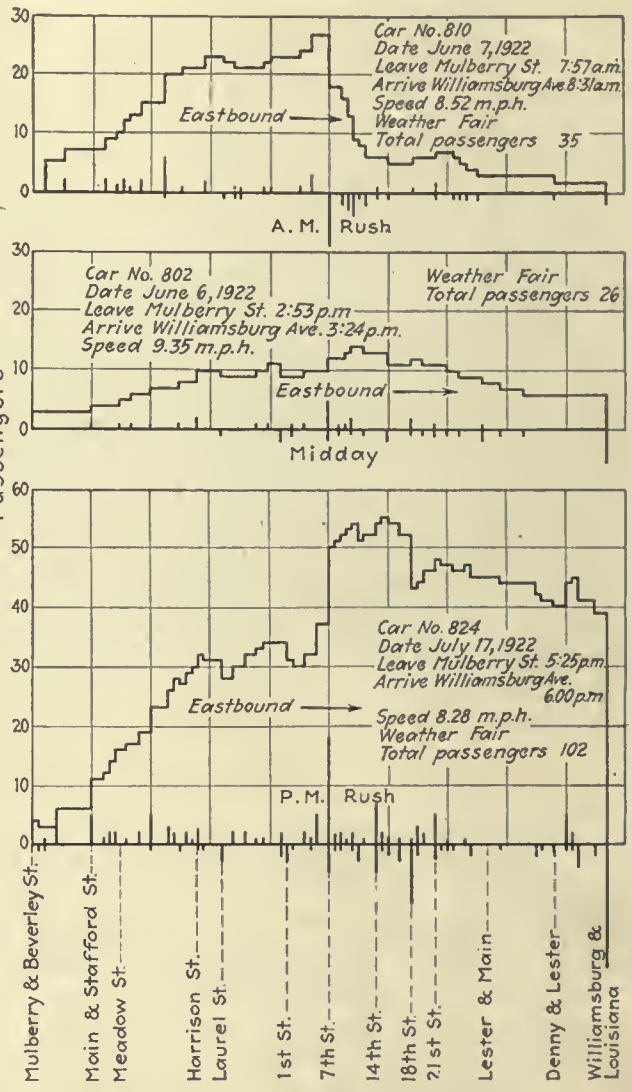
The plan outlined in the preceding discussion has been laid out with a view to giving the best service for the entire city of Richmond. The operation will also be conducted with regard to economy and efficiency. Schedules based on this plan show savings in every department, due to a reduction in car-miles or car-hours operated. Those calculated have been the savings in maintenance, power, and trainmen's wages. Savings in other accounts, such as supervision of transportation, accidents, damages, and general miscellaneous expenses, have not been estimated, though there will be some reduction in these items. On the above basis, the total saving from routing and service changes will amount to $251,790 annually. The only capital expenditures required are for a revision in the special work at four points. To offset these, there is a certain amount of track to be retired, so that the capital account should not be increased, and there should be no addition to the fixed charges. As new cars are not needed to put the entire program in effect, there should be no delay in proceeding with it.

Effect of Savings on Finances of Company

Based on the latest information available, the revenues and expenses of the Richmond railway division, operating on a 6-cent fare, are approximately as follows:

Gross earnings		$2,621,000
Operating expenses	$1,739,900	
Replacements and renewals	187,500	
Taxes	251,600	2,179,000
		$ 442,000
Other income less deductions		49,400
Net Income		
Sinking fund charges		51,200
Amount available for interest, etc.		

The above amount is almost exactly 6 per cent on the reproduction cost of the property new, less depreciation,



Typical Car Loading Curves, Taken by Observer on Car
The verticals above and below the zero line show the number of passengers boarding and leaving the car at each stop.

of $7,355,000 as determined by the Beeler organization. A 7 per cent return on the valuation would call for $515,000 in round figures.

With the successful inauguration of the more efficient routing and scheduling just proposed, there will be an increase in the net income of some $252,000 annually, bringing the total net up to $692,000 annually. After deducting from this the $515,000 required to pay 7 per cent on the investment, $177,000 will remain, which may be applied for lowering the fare or for other purposes. A return to the flat fare of 5 cents at the present time would, undoubtedly, reduce the gross revenues practically one-sixth or about $437,000. To make this possible and at the same time permit a 7 per cent return would require some $260,000 additional savings. This rate of return is used for purposes of illustration only.

Further Economies Possible

The economies already recommended may be obtained with a few minor changes in track. With the co-operation of the authorities and the public, other improvements can be made with further economies. There is no reason why practically all the service in Richmond cannot be given with one-man cars, if the

methods already recommended for traffic control and rush-hour loading are employed. This would require the purchase of additional equipment if the safety type of car is used. For certain purposes the best of the two-man cars may be remodeled to give fair service with one man, although of course they will be inferior to cars designed for the purpose. By a careful readjustment of the stopping places throughout the city to conform to the standard of eight per mile as nearly as practicable, patrons would be afforded faster and better service, and at the same time further operating savings would result.

The re-establishment of an effective power-saving device, followed up energetically by the management and co-operated in by the men should save a considerable amount of the power now used. Other companies have been able to reduce their power bills 10 per cent or more in this way, and Richmond should do as well. Were the jitneys eliminated the company undoubtedly would be able to get a large share of their patronage and should add some $125,000 to the net earnings. None of these economies should interfere with the requirements of good service, but on the contrary, if properly carried out, they should improve the performance of the cars and give better results for the public.

The trend in traction settlements for some years past has been strongly toward the service-at-cost plan. The one serious defect in this method, however, is that with valuation fixed and rate of return determined, managements naturally are content to proceed along lines of least resistance. Indeed, under such conditions, it is most unusual that one will make strenuous efforts to reduce the rate of fare. To stimulate a management to strive for the highest attainments there must be an incentive.

A plan can be provided whereby the benefits resulting from efficient management may be shared by the public and the owners of the property. For illustration, suppose the company be allowed to earn 7 per cent on its valuation with the present rate of fare. The adoption of the improved routing, together with the application of economies set forth herein, should prove more than sufficient for this. The savings may be used to reduce the fare. As the fare is reduced, allow the company to earn an increased rate of return if it can do so by operating more efficiently. For instance, if the fare can be reduced to 5½ cents (or nine tickets for 50 cents), the return may be increased to 7½ per cent; should the fare be reduced to 5 cents the return may be 8 per cent, and so on. With such an incentive the company should exert all its energies toward giving the best possible service at the lowest possible fare.

New Cars Embody Unusual Features

Kansas City Railways' Multiple-Unit Cars Are Used in Trains in Rush Hours, with Three Men for Two Cars, and as Single Units in Non-Rush Periods—Facilitate Handling of Peak Load, with Operating and Investment Costs Minimized

By E. B. Sanders
Publicity Manager Kansas City (Mo.) Railways

IN ORDER to provide equipment which can be operated most economically and efficiently, the Kansas City Railways has recently placed in operation twenty new multiple-unit cars built by the G. C. Kuhlman Car Company of Cleveland, Ohio. The control equipment of these new "1400" type cars, as they are known, is so designed that they can be operated not only in two-car trains with three men, but also as single units with either one or two men. The many steep grades and short curves in Kansas City have made the use of large trailers impracticable. Accordingly, the new trains consist of two motor cars rather than one motor car and a trailer.

These new cars were built from the specifications of the "1100" and "1200" type cars which have been so successfully used since 1915. A few minor changes were introduced in the new cars, and are also being built into the "1100" and "1200" type cars in the Kansas City Railways shops. The new cars are equipped with Westinghouse standard HL control, four General Electric 247 motors, the Safety Car Devices Company air brakes, and the St. Louis Pneumatic Devices Company rear-end door control.

An unusual feature of this equipment is that the HL control has been combined with the Safety Car Devices Company equipment on double-truck cars embodying the one-man operating features. All safety features embodied on the one-man type of car have been applied to this new equipment, and in addition to this a new type of rear-end control has been worked out. The rear doors on these cars can be controlled by conductor's valve, or by a street collector's valve on the outside of the car near the rear doors. All apparatus used to make connections for two-car train operation is a permanent part of the car equipment, so there is no delay in coupling up single units for train operation.

A matter of special interest was the working out of satisfactory coupling connections. For many reasons it was desired to operate the trains with only one trolley, which necessitated the carrying of a bus line, in addition to the control wires, through the coupler. The Tomlinson automatic coupler was adapted with minor changes in anchorage. Installed on one side of the coupler head is the bus line circuit, and on the opposite side the necessary HL control wires, compressor synchronizing wire, door signal wire and conductor's signal; all this is in addition, of course, to the air connections. Just back of the coupler is installed a group of disconnecting switches which couple simultaneously with the air connections of the coupler, so that with one operation the air cocks are closed off and the electric disconnections made. In this way whenever the cars are operated as single units the coupler is dead.

All doors on the cars are interlocked with the brakes, and it is impossible to start a car or train with any of the doors open. The motorman also has signal lights



Two-Car Train In Service, Trolley Used on Head Car Only

which show when the doors are closed, and he is governed by these lights, not starting until the lights show that the doors are all closed.

All cars are equipped with the standard M-28 type of brake valve which controls the front door operation. The rear doors are controlled by the conductor's valve or street collector's valve. It is impossible to open or close these rear doors from one valve, without the other valve being in "door closed" position, as they are connected in series and operate separately by means of a double check valve and relay valve which also interlocks the door with the brake system. If the doors are opened while the car or train is moving, brake application is immediately made. The equipment on all cars is identical and it is possible to make connection through the Tomlinson automatic coupler with the cars in any position. With the coupler disconnecting switches closed, that is, when current is on the second car through the bus line, the cut-out cock is open, permitting the passage of air into the brake system on the second car. If for any reason the coupler connection is broken or cars are separated without first closing the disconnecting switches and cut-out cock, the emergency air line in the braking system opens to atmosphere through the coupler head, setting the brakes on both cars in emergency. If by mistake the operator neglects to open the disconnecting switches and simply pulls the coupler open to disconnect the train, thus leaving the points alive on the coupler, the cars as separate units cannot be moved until the disconnecting switches are closed. This interlocking feature is accomplished by having the cut-out cock, which is placed in the air line to the coupler, operated by the same mechanism that operates the disconnecting switches. This combined operation is performed by the manipulation of a small handle mounted under the bumper iron on each car.

In respect to doors and steps, both front and rear platforms are the same. The doors are handled with the air valve, opening to the full width of the platform. The rear platform is equipped with a conductor's rail, and folding seats for passengers. The front platform is the same as any other standard platform on this class of equipment, with the exception of a motorman's railing and a swinging gate which when closed permits



Wide Aisles and Comfortable Seats Outstanding Features



Coupling Arrangement for Two-Car Operations

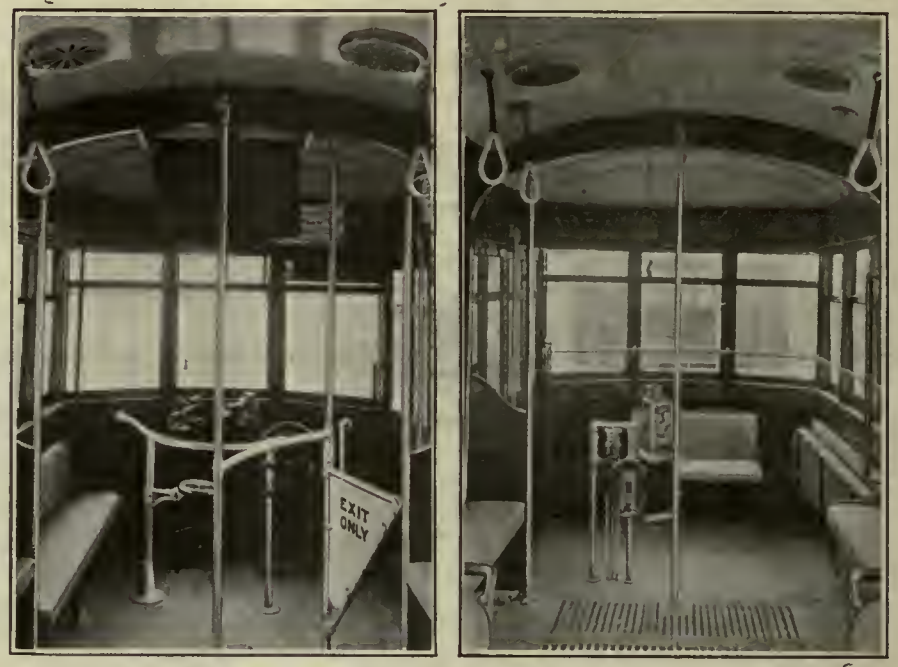
loading only through the front half of the door. If desired for two-man operation, however, this gate may be locked open.

Both the passenger and conductor's signal systems are a little different from those usually used for train operation. The passenger signal reaches only the conductor, who in turn relays it to the motorman. The passenger push buttons are the Faraday high-tension buzzer buttons connected to Faraday buzzers. The Faraday single-stroke bell is used by the conductor.

A city ordinance requiring that a light be kept burning at night on the rear end of each car while on the streets necessitated the installation of a battery system. A double-acting relay, designed and built in the Kansas City Railways shops, was installed. This operates a small tail lamp which burns only when the power is removed from the car. A two-way switch is used to connect the charging system and the passenger buzzers, making it impossible to work the buzzer system until the switch is thrown on. Connecting these two in this manner permits a trickle charge of 0.1 amp. to flow into the battery at all times that the cars are in use. If this switch is on and the power off of the car, as in a storage yard, the tail light on the car continues to burn, indicating to the crew or the watchman that the switch has not been thrown to the off position. The fenders were designed by the Eclipse Railway & Supply Company of Cleveland, Ohio, and allow the coupling of the cars without being removed.

These cars have now been in operation for a period of more than three months and have measured up to expectations in every way. No changes have been made as to the original layout, and none are contemplated.

The accompanying tables give a fair sample of the air control tests made on one and two car trains. A study of this table is very interesting and the indications are that the same efficiency will be obtained on this style of equipment that has been adopted as standard on one-man single-truck cars.



Front and Rear Platforms, Showing Folding Seats and Exit Features

The following results indicate the compressor operation on cars 1105 and 1116 operating as multiple unit. These results do not represent normal car operation, because a number of emergency applications were made. Emergency application and door operation receive air from reservoirs on both cars, but for straight air application air is furnished by the reservoir on first car only.

OPERATION TESTS—AIR EQUIPMENT

CAR NO. 1105.

(ALL TESTS MADE BETWEEN 50 AND 65 LB. OF AIR)

Piston travel—4 in.	Time of Operation
Governor cut-out at 65 lb.—Cut-in at 55 lb.	
Brake cylinder application, 0 to 50 lb.	2 seconds
Brake cylinder release, 65 lb. to 0	1½ seconds
Secure controller handle emergency in	1½ seconds
Release after control handle engaged	8 seconds
Secure brake-valve emergency	½ second
Release after brake-valve emergency	8 seconds
Application of brakes to 50 lb. by rear door opening	1½ seconds
Release by closing rear door	3½ seconds

TWO-CAR TRAIN, CAR NOS. 1105 AND 1116

Brake cylinder 10 in. x 12 in.—4 in. piston travel	
Brake cylinder application, 0 to 50 lb.	2½ seconds
Brake cylinder release, 65 lb. to 0	3 seconds
Controller handle emergency	2½ seconds
Controller handle release	11 seconds
Brake-valve emergency	1 second
Brake-valve release	12 seconds

Car weight, 38,000 lb.
111 per cent braking ratio with 50 lb. cylinder pressure.

TWO-CAR TRAIN STOPS SERVICE APPLICATION

Miles per Hour	Time	Test	B. C.
25	8 seconds	130 lb.	50 lb.
30 down grade	9 seconds	200 lb.	50 lb.

CONTROL HANDLE EMERGENCY STOP

Miles per Hour	Time	Test	B. C.
30	7½ seconds	125 lb.	50 lb.

BRAKE VALVE EMERGENCY STOP DOWN GRADE

Miles per Hour	Time	Test	B. C.
30	11 seconds	210 lb.	50 lb.

GOVERNOR OPERATION

FIRST CAR—NO. 1105

Duration of test	1 hour, 20 minutes, 40 seconds
Compressor "on"	22 minutes, 17 seconds, or 27 per cent of time
Compressor "off"	58 minutes, 23 seconds, or 73 per cent of time
Number of governor operations	17
Average time "on"	1 minute, 29 seconds
Average time "off"	3 minutes, 27 seconds
Pressure increased from 55 lb. to 65 lb. in average time of 1 minute, 29 seconds, or at the rate of 6.66 lb. per minute.	
Type of compressor Car No. 1105	CP-27
Type of governor	S-6-A
Size of reservoir	16 in. x 42 in.

SECOND CAR—NO. 1116

Duration of test	1 hour, 20 minutes, 40 seconds
Compressor "on"	19 minutes, 32 seconds, or 24 per cent of time
Compressor "off"	61 minutes, 8 seconds, or 76 per cent of time
Number of governor operations	18
Average time "on"	1 minute, 7 seconds
Average time "off"	3 minutes, 24 seconds
Pressure increased from 55 lb. to 65 lb. in average time of 1 minute, 7 seconds, or at the rate of 8.95 lb. per minute.	
Type of compressor on Car No. 1116	CP-27
Type of governor	S-6-A
Size of reservoir	16 in. x 42 in.

Big British Electrification Impending

THE *Electric Railway & Tramway Journal* states that specifications for the work involved in electrifying the South Eastern & Chatham Railway for a radius of 15 miles from London are to be issued at once and the work will be inaugurated almost immediately. It is expected to take two years to complete, and for that period between 16,000 and 17,000 men will be engaged, either on the electrification of the line or in making the equipment for it. The main stations which the electrification will reach are Dartford, Orpington, Addiscombe Road (Croydon) and Hayes. Between these points and London the intention is to operate more frequent and more rapid services, with a considerable addition to seating capacity during rush hours.

Automatic Substation Experience in Cleveland—II*

The Author Traces in Detail the Sequence in Operations of the Present Substations of the Cleveland Railway, Which Are Designed Particularly to Give Reliability of Power Supply

By L. D. Bale
Superintendent of Substations the Cleveland Railway

TO THOSE who have not had the opportunity of becoming intimately familiar with the scheme of operation of an automatic installation, the sequence chart of the Cleveland installations, shown in Fig. 7, may seem unduly complicated, so much so, possibly, that dependability in continuous operation might be questioned. The contrary is, however, the case. Experience with these installations, together with reports from other properties utilizing automatic control, indicates that, when the equipment is properly installed and receives adequate inspection and maintenance, the utmost confidence may be placed in its operation.

The operation of the individual converters in the Cleveland installations does not vary greatly from that of the general scheme of automatic operation with the exception that a greater number of service protective features than usual have been installed. The occurrence of higher current values than have been encountered in previous automatic railway converter substation work adds some complications, as does also the necessity for protecting the air-blast transformers against air failure. The presence of the second converter in these stations, likewise, creates an interesting item of control.

First Converter Connected to Load

The initial start is accomplished through the operation of voltage relay No. 1, which closes its contact when a predetermined low value of trolley voltage occurs. This action causes the master relay No. 3 to close, and starts operation of the delay motor-drive relay No. 27. This is followed by the closing of the oil switch which energizes the power transformers. As the auxiliary 410-volt a.c. bus is energized from the secondaries of the power transformers, the starting contactor No. 6 is closed, connecting the converter to the one-half voltage tap of the transformer secondaries. There is a pause in the operation at this point sufficient to allow the converter to pull into step. In the event that the converter potential builds up in the wrong direction it is, of course, necessary to reverse the field to cause the converter to slip a pole. This is accomplished through the action of polarized motor-drive relay No. 7.

This relay, having a permanent field, has the armature connected directly across the armature of the converter. If the converter potential builds up reversed, the armature of No. 7 relay will revolve in a counter-clockwise direction. If, on the other hand, the potential builds up in the correct direction, the armature will revolve in a clockwise direction. The armature, in revolving, drives a set of contacts which perform certain operations, depending upon the direction of rotation. In the event of incorrect potential, connection is made through No. 7 relay contacts for reversing the shunt field of the converter through the operation of field contactor relay No. 9 and field contactor No. 10.

As the voltage of the converter falls to zero under reverse field connections, No. 10 contactor again operates and reconnects the field in the normal operating position. The converter thus is given an opportunity to build up in the correct direction. With correct d.c. potential, No. 7 relay, in rotating in the clockwise direction, causes the transfer to be made from the one-half a.c. voltage starting taps to the full a.c. voltage running taps by opening No. 6 contactor and closing the three No. 11 contactors. Interlock connections are then made, energizing the brush-operating device, No. 31, which lowers the brushes on the d.c. commutator. As this device completes its operation, a contact is made, closing the equalizer contactor No. 39.

The operation of No. 39 contactor completes an interlock circuit closing No. 12, the first of the d.c. contactors which connect the converter through the current-limiting resistance to the load. The resistance shunting contactors, Nos. 14, 15 and 16a and b, are closed in turn, provided the load is not in excess of the calibration of the various controlling relays. As No. 16 contactor closes, the circuit for No. 27 time-limit relay is opened. The function of this will be explained later.

Under normal conditions, as the load upon the first converter increases to the point where it is desired to have the second machine in parallel, the operation of No. 34 thermal relay (after an interval of approximately fifteen minutes) sets up a circuit, causing the second machine to be started, similar to the circuit derived through the under-voltage relay No. 1 in the case of starting the first machine. The action of No. 34 relay is dependent upon a condition simulating, as nearly as possible, the mean square heating effect of the current in the armature conductors of the converter. In this manner full advantage is taken of the overload capacity of the converter, with the result that a higher operating efficiency is maintained.

When the load has decreased to a point where it is desired to discontinue the operation of the second converter, underload relay No. 13, whose contacts close at a predetermined minimum d.c. load, again energizes No. 27 delay relay. After operation has continued for a definite time (fifteen minutes) the closing of No. 27t contacts will cause the control circuits to be de-energized, and allow the second machine to be disconnected. The first converter is also shut down in the same manner, when the load upon that machine has decreased to a predetermined low point for a definite time.

*For the first article in this series see issue of this paper for March 3, page 359.

In the event that only one machine is in operation, and an overload is encountered that is of sufficient volume to cause the insertion of current-limiting resistance in the converter circuit, the second machine is put into operation in one and one-half minutes, through the action of No. 27 relay (No. 27s contacts) of the overloaded machine, thus securing the service of additional equipment without having to wait for the operation of the thermal starting relay No. 34.

Protective Features Which Are Included

Failure of Converter to Start.—In the event that the converter armature does not revolve upon the application of starting current, relay No. 53, energized from a current transformer in one of the starting leads, opens the control circuit and cuts off the energy supply before damage to the armature conductors can be done.

Failure of Converter to Complete Cycle of Operation on Starting.—If for some reason the converter does not complete its cycle of operation, No. 27 delay relay, which is started simultaneously with the starting of the converter, will cause its No. 27s contacts to be closed in one and one-half minutes, shunting out the relays of the converter that has failed and placing the second machine in operation instead. As the demand upon the second machine reaches a point where additional equipment is desired, the control is so arranged that an attempt will be made in this case again to start the machine that has failed. If the converter fails a second time its control circuits will again be de-energized, and, upon a third attempt to operate, it will be locked out through the operation of No. 30 relay, which will be discussed later.

A.C. Overloads—For overloads of abnormal value, such as short circuits within the station itself, a.c. overload relays are provided.

D.C. Overloads.—Overloads on the d.c. side are limited by inserting current limiting resistance in the converter circuit in three sections, by causing one or more of the resistance shunting contactors (Nos. 16a and b, 15 and 14) to open, depending upon the severity of the overload. These contactors on the two converters are controlled through relays in such a manner as to synchronize the action of the contactors and, in this way, prevent pumping.

Bearing Protection.—Should the converter bearings reach a dangerous temperature the thermal relays No. 25 will function, shutting down and locking out the converter.

Balance Phase Protection.—To prevent the possibility of the converter running single phase (due, for example, to the failure of a contactor to close), relay No. 45 is connected across three current transformers in the low voltage side of the converter, so arranged that, in the event of the unbalancing of the transformer circuits, the relay will operate and disconnect the converter.

Low A.C. Voltage or Its Entire Failure.—If the voltage is too low for proper operation at the time of starting, No. 2 low-voltage relay will not make contact. If the voltage drops during starting or after the start has been made, No. 18 relay will close its contacts, causing the starting contactor to open. In the event of low voltage during operation, No. 49 relay, whose contacts are set to close at a voltage corresponding to the minimum at which the converters will operate satisfactorily, will complete a circuit shunting out No. 50 relay, which in turn, opens the circuit of No. 3 master relay, thus causing the converter to be disconnected from the line. No. 50 relay also prevents the converters from being locked out by the action of No. 27 relay (No. 27s contacts) in the event of failure of a.c. power lasting more than one and one-half minutes.

D.C. Reverse Current.—Reverse current relay No. 32 will remove the converter from the bus in the event of reverse direction of flow of current.

Overspeed.—The customary overspeed device has been supplied on the converter shaft, which works in con-

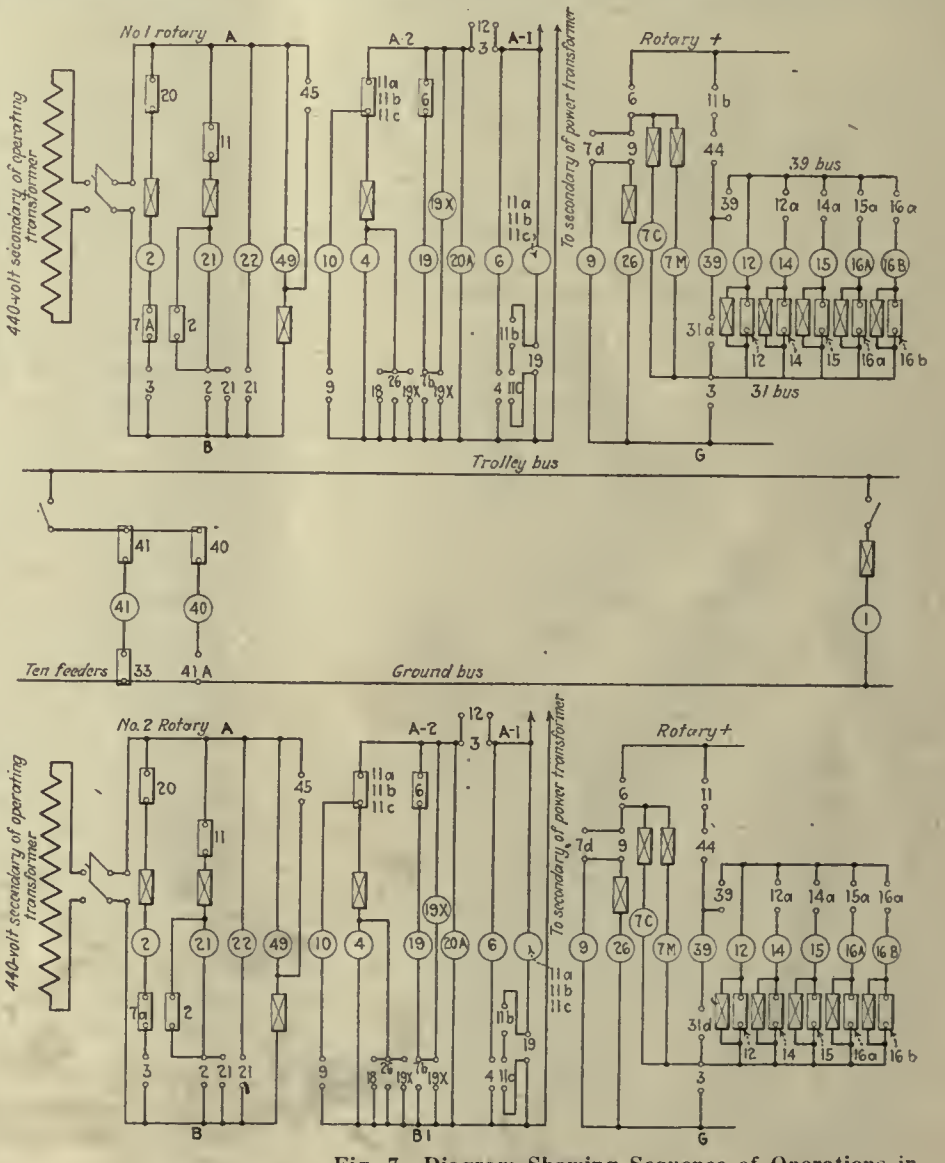


Fig. 7—Diagram Showing Sequence of Operations in

nection with the manually operated circuit breaker in the converter positive between the bus and the various positive contactors and resistances. This circuit breaker, in opening, disconnects the converter from the d.c. bus and completes an interlock circuit, shutting down the converter.

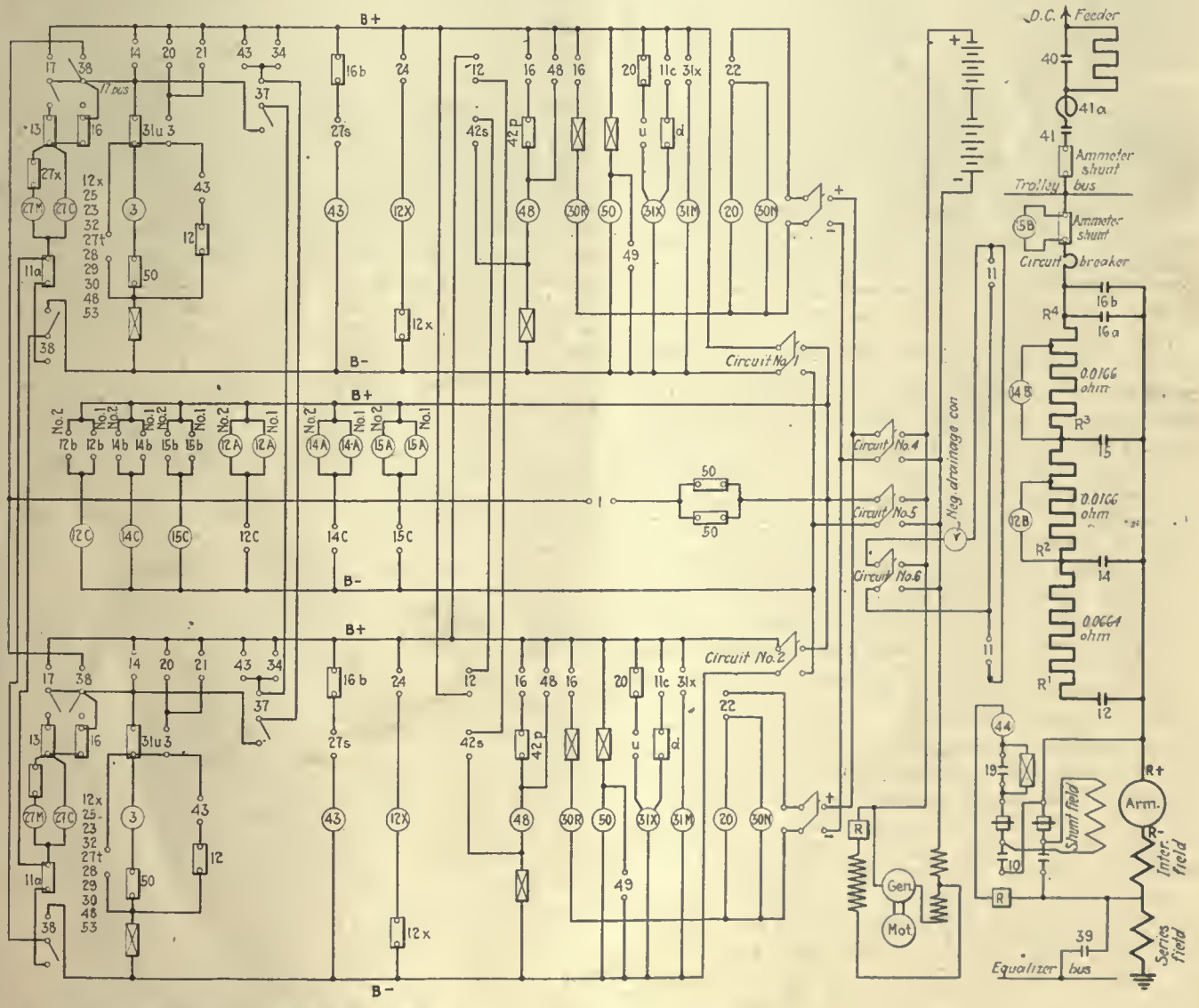
Field Reversal Limiting Relay.—Occasionally a converter is found that will persist in building up its potential in the reverse direction. In automatic operation, if some special preventive measures were not taken, it would be possible under abnormal conditions to have a converter continually reversing its field, thus consuming the one and one-half minutes allowed for its complete cycle of operation, and, as a result, shutting down through the operation of No. 27 relay. To help rectify this condition a notching-up relay, No. 26, has been provided, which will allow the field to reverse three times in succession and then cause the starting contactor to open for a few seconds. After the time allowance in connection with No. 26 relay has elapsed, the starting contactor is again free to close, and three more attempts, if necessary, are made to reverse the field.

Failure of Field Circuit.—Relay No. 44, whose coil is in series with the shunt field circuit, will prevent the converter from being connected to the load in the event of open or no field, or will shut down the converter in case it is already in operation.

Continuous or Sustained Overloads.—To protect the converter against sustained or repeated overloads, brought about by some abnormal condition of loading or, possibly, failure of control, thermal relay No. 29 is provided. This relay operates on the same principle as No. 34 relay, being calibrated, however, for a longer time interval. In the event of operation the converter is removed from service.

Protection of Transformers Against Air Failure.—This phase of the control presented some difficult angles. It was realized that it would be a simple matter to protect each individual transformer bank against air failure by shutting down the converter connected to that bank. But, the adoption of such a scheme would mean that 50 per cent of the equipment (of a two-unit station) would be thrown out of service by reason of the failure of a blower. The possibility of such an occurrence, particularly during peak-load periods, necessitated the finding of some other solution to this problem.

The scheme of protection finally adopted resolved itself into the utilization of air pressure relays (No. 42) on each transformer, which, in the event of air failure



Automatic Substations of Cleveland Railway

with but one converter in operation, will cause that unit to be discontinued from service through the action of No. 48 relay. The resulting demand for equipment (caused by the immediate lowering of the d.c. bus voltage), will subsequently close No. 1 relay in the attempt to place this converter again in operation. This being impossible (because the converter is locked out by No. 48 relay), No. 27 relay will operate and through No. 27s contacts cause the second unit to be started. Both blowers discharge into a common air chamber under all transformers, hence, when the second unit goes into operation with its blower, air is supplied again to all of the transformers, and, as a result, the No. 42 relays on the transformers originally discontinued from service will reset, relieving the locked out circuit on the first converter through the operation of No. 48 relay. By this scheme of control it will be noted that the first converter is again applicable for service upon demand, and will be placed in operation through the normal functioning of No. 34 relay of the machine in service, or through No. 27 relay in the event of overloads.

Lockout Features.—Several of the protective devices, during the course of their operation, form but a momentary circuit, shunting out the master relay No. 3 and causing the converter to be shut down. It is, therefore, necessary to have some provision at hand to prevent the continual starting and stopping in the event of operation of protective devices which have no lockout features in themselves. Relay No. 30, known as lockout relay, is provided for this purpose and is so arranged that each closing of the a.c. oil switch causes a coil of the relay to raise a specially constructed mechanism one notch. If the converter completes its cycle of operation, a second coil of the relay (No. 30r) is energized, returning the mechanism to the original position. On the other hand, if the converter attempts to start twice, that is, if the oil switch is closed twice, without the converter being connected to the load, then upon the third closing, the converter will be definitely locked out.

D.C. Feeder Control.—The proper method of outgoing d.c. feeder control has been one of the most troublesome problems of the whole automatic development. There was installed (and, in fact, still exists in the Cleveland plants) the only type of automatic feeder control available at the time these stations were built. In this scheme, current limiting resistance is introduced into the feeder circuit by the opening of the resistance shunting contactor in the event of overload or grounds. If the overload persists, the feeder is finally disconnected from the station bus entirely. This scheme of feeder control has proved very successful when applied to interurban and suburban work, but for urban systems the scheme has certain limitations which make it undesirable for this type of service.

For example, a feeder in urban work may be quite often subjected to legitimate overloads from extraordinary car movements, traffic delays or, possibly, power trouble on the system elsewhere. Under these conditions, it certainly is not desirable either to lower the potential on the feeder by cutting in resistance, or to allow the feeder to be disconnected from the source of power, which in all probability is capable of handling the overload. Such a procedure would tend to make operating conditions still worse. On this property, where a premium is placed upon continuity of power supply, the policy is adopted of "burning off" all grounds possible. This phase of operation cannot be obtained with the resistance type of feeder control unless the ground is light and the current necessary to clear the ground is within the capacity of the current-limiting resistance, or nearly so.

The Short-Circuit Detector Prevents Unnecessary Interruptions of Power Supply

Within the past year there has been made available a new system of automatic feeder control, known as the short-circuit detector, or differentiating method, that is, a system differentiating between legitimate overloads and grounds. This scheme utilizes a current transformer whose primary is formed by the d.c. feeder cable. The secondary is connected with control relays, which, in turn, cause the feeder contactor to be opened only when sufficient current is induced in the secondary by the flow of short-circuit current in the feeder cable. By this method, the feeder is disconnected from the source of supply only in the event of a ground, service again being restored when the ground is cleared. By utilizing this scheme the feeder is not subject to the disadvantage of a reduction in potential in the event of legitimate overload. The scheme as it stands does not, however, adapt itself to the process of "burning off" grounds.

A feeder control system is at present being installed in the Cleveland automatic substations utilizing the most important features of the detector, or differentiating, system of feeder control, together with an auxiliary feeder bus frequently used in manual plants, and, in addition, remote supervisory control that, when installed, will afford complete control of the direct-current feeders.

With this system in operation all feeders will, as at present, be connected to the main converter bus. In the event of a ground the feeder will automatically be disconnected from the main bus and transferred or connected to the auxiliary bus. The auxiliary bus and the faulty feeder may then be energized by causing one or more tie feeders, fed from other sources, to be transferred to the auxiliary bus by remote control. In utilizing the potential drop of these feeders, energy may be supplied to the faulty feeder, clearing it of ground and at the same time distributing to two or more plants the possible total overload resulting over the feeder system. When the feeder has been cleared of ground it will automatically be retransferred to the main bus again.

A Device for Handling Faulty Feeders

There is also available a heavy-duty current-limiting resistance which may be connected by remote control between the main and auxiliary buses for handling faulty feeders. Both the resistance and the tie feeders may be utilized simultaneously for this purpose.

Which of the methods will be used in clearing a faulty section will be dictated by conditions existing at that particular time, regarding condition of the plant from which the faulty feeder originates, station load, equipment reserve or availability, etc. It will be noted that with the exception of the one heavy duty d.c. bus tie resistance, all individual feeder current limiting resistances are eliminated.

Details of the remote supervisory control and load indication, operating experience with the present automatic substations and proposals for future substations, will be covered in the third and last article in this series.

4,000-Volt D.C. Italian Electrification Successful

Picturesque Route from Turin Northwestward Was Electrified in 1920—High Voltage Was Selected to Minimize Number of Substations and Insure Good Transmission Efficiency

IN ANOTHER part of this issue is a letter from the Tecnomasio Italiano Brown Boveri, referring to the electrified railway operating between Turin and Cérès, Italy. This is a distance, measured along the railway route, of 26.6 miles. The railway was built from Turin northwest to Lanzo in 1876, and was extended to Cérès between 1913 and 1916. From Turin the railway climbs progressively, with one short stretch excepted, until Cérès is reached. The grade increases from 0.83 per cent to 3.5 per cent, the last for a distance of less than 2 miles between Pessinetto and Cérès. Between Turin and Borgaro, and Ciriè and Cérès the track is single; being double between Borgaro and Ciriè. The route is a picturesque one, the western end being of a mountainous character. The construction of the line is in harmony with the beauty of its surroundings.

It was expected that the line would be electrified when the western section was built, but the war interfered. However, in 1918 money was raised for the electrification and operation was inaugurated in September, 1920. The voltage of 4,000 was selected so that only one substation would be required and to give good transmission efficiency. This substation, located at Ciriè, receives three-phase, 22,000-volt, 50-cycle power from the Société Anonyme d'Electricité Alta Italia. Provision is made for taking power either from the plant at Funghera or from a steam station in Turin.

In the substation each converter group consists of five machines mounted as a unit: a three-phase synchronous motor, two 2,000-volt generators connected in series, and two exciters, one for the motor and one for the two generators. The motor exciter has an auxiliary winding in series with the generators so as to improve the power factor of the load. At present two converting sets are installed and there is provision for a third. Each motor is rated at 716 kw.

The contact line has a simple catenary suspension, the area of the contact wire being 120,000 circ.mil (between 0 and 00 A.W.G). A feeder of the same size is used in the Ciriè-Cérès section.

There are five locomotives with these characteristics:

Length over bumpers	42 ft.
Distance between truck centers	16 ft. 5 in.
Rigid wheelbase of trucks	7 ft. 10½ in.
Diameter of driving wheel	38½ in.
Total weight	46 tons
Motors, four in number	140 hp. each at 20 m.p.h.
Voltage at brushes	1,800
Gear ratio	1:3.95
Maximum speed of locomotive	40 m.p.h.
Tractive effort at 20 m.p.h.	10,025 lb.
Maximum braking effort	20,500 lb.

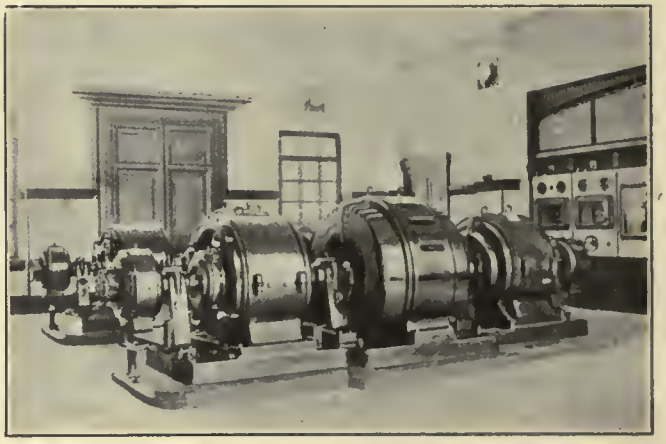
The locomotives have two pantographs each, with greased aluminum shoes.

The coaches used by this road are of two types: first and third class, seating seventy-two persons, and third class, seating eighty persons. Both are double-truck, 61 ft. 8 in. long over bumpers and of 32 tons weight. They are divided into four compartments and three platforms, one in the middle.

The cost of this installation was 5,699,340 lires, or about $1,100,000 at par exchange. Of this the substation cost $312,000 ($83,700 for the building, the remainder for the equipment); the aerial line and track bonding cost $400,000; the locomotives cost $360,000, and the remainder was for miscellaneous expense. With about 40 miles of aerial line, of which 7½ miles is in the stations, the cost per mile of line is less than $10,000, even with copper at 87 cents per pound. The substation cost $7,750 per mile of single track, and $212 per kilowatt installed. Each mile of electrified track cost a total of $27,300.



4,000-Volt Locomotive Used on Turin-Lanzo-Cérès Railway



Interior of Substation at Ciriè

The Hope of Reward

Mr. Nash Argues for a Monetary Incentive for Efficient Public Utility Operation

IN A three-page article in the *Electrical World* for March 10 L. R. Nash of Stone & Webster urges the adoption by commissions of some rating or merit system for efficient service by public utility companies. The article is entitled "The Hope of Reward." He declares that the tendencies of the day toward standardization and co-ordinated effort are destructive of the highest moral standards and efficiency and of that individual incentive which is necessary for both.

The public service field, he says, because of its comparative youth, pioneer spirit and enthusiasm for progress, has not yet yielded to the conventionalizing influences as much as some others, but if they continue, the yielding is inevitable. A system of regulation which reduces rates when a gain in economy has been secured by the business skill of the management acts to dis-

courage further improvement. In that case, he thinks, 18 holes of golf on pleasant afternoons will prove much more interesting to executives than saving a tenth of a pound of coal per kilowatt-hour for the benefit of their patrons.

As an illustration he suggests a railway company which, by putting on one-man cars or car energy-measuring devices could effect important economies, but if all the savings are to go to the patrons, why bother? He also cites, as a case from actual experience, a company which spent considerable money in planning out a welfare system for its men, in the hope of securing greater efficiency and improved morale from them, but a commission, in a rate investigation, excluded these expenses from the cost of service on the ground that the company should not be reimbursed for them unless or until the program had been put into effect and had proved profitable.

In conclusion Mr. Nash says that one of the state commissions had recently developed an interesting system of grading public utilities, but the purposes of the grading have not been disclosed. If there is a slight difference, say 10 per cent, he thinks, in the valuation or rate of return, based on some merit system, it would have a negligible effect upon the amount paid in rates by the bulk of a utility's patrons, but to the utility it would have a great incentive to improvement and progress.

French Progressing with Electrification Projects

Comments on the Tremendous Developments Already Under Way on Three Great Transportation Systems —Review of Considerations Which Render This a Logical Program

BY J. C. THIRLWALL
Railway Engineering Department, General Electric Company, Schenectady, N. Y.

FOR the time being the center of greatest activity in steam railroad electrification is France, where a program involving approximately 5,000 route-miles, mostly double track, has been adopted. The Paris-Orleans, the Paris-Lyons-Mediterranean and the Midi systems are involved and the work is to be carried out within the next twenty years. The direct incentive for this move was the desire to conserve fuel and to utilize water powers to the greatest possible extent, but the need for increasing track capacity also influenced the decision.

Many railroad men in this country picture European traffic as much lighter than our own, based on the well-known fact that locomotives and cars, both passenger and freight, are smaller and lighter than we are accustomed to on our main systems. It may be illuminating, therefore, to outline the basic traffic on the Paris-Vierzon division of the Paris-Orleans Railway, for which electric equipment has been ordered and which will shortly be electrically operated. This division includes 25 miles of four-track and 118 miles of double-track road. One complete steam engine division for through trains and one suburban division will be involved in the change-over. The traffic over this route, at the outbreak of the war, was crowding the track capacity. While it slumped immediately after the war, it is again expanding and the basic schedules for which equipment contracts have been placed call for the following train movements out of Paris daily: 44 freight trains and 106 passenger trains, about half of which are suburban trains consisting of motor cars and trailers. The freight trains average about 1,100 to 1,200 tons of trailing load, the through passenger trains from 400 to 700 tons of trailing load, and the motor-car trains 325 to 490 tons total, depending on whether the trains are six-car or nine-car make-up.

Altogether the daily traffic over the 78 miles between Paris and Orleans, about one-third of which is four track, is about 11,000,000 ton-miles. Of this about 5,000,000 ton-miles is freight, with approximately the same amount of locomotive passenger train ton-miles, and about 880,000 ton-miles in motor-car train movements.

Equipment already ordered by the Paris-Orleans includes 200 locomotives and eighty motor cars. The high-speed passenger locomotives weigh 123 tons and are capable of pulling a 580-ton train at a speed of 75 to 80 m.p.h., the schedule speeds on the fastest runs being as high as, and in some instances higher than, anything in this country. For the freight service, switching and local passenger runs, 71-ton locomotives will be used, two being coupled together as a 142-ton unit for the heavier freight movements, the double unit, however, requiring but a single engine crew. The first electrified division, as stated above, will cover 143 route-miles and extensions will be made at frequent intervals, the first to Limoges, an additional engine division about 175 miles beyond Vierzon, and next some east and west routes where gradients are severe.

On the Midi, the first electric operation will be over the mountain division in the Pyrenees, some of which are already electrified, and the present contracts cover about 155 route-miles. The company has selected for use in freight, local-passenger and express-passenger service over heavy grades an 80-ton eight-wheel locomotive, all the weight being carried on the drivers. The motors are capable of delivering 1,000 hp. continuously, and 1,400 hp. for one hour. The passenger locomotives are geared for a maximum speed of 60 m.p.h. All locomotives are arranged for multiple-unit operation, so that two or more can be coupled together and operated by a single crew, for use on the heaviest trains.

The program which is now under way in France is, of course, the outcome of the comprehensive study made some years ago by a large commission. Now that the work is actually being carried out it may be interesting to review the important considerations which render the present program a logical one.

In the first place, the rails and bridges in France are so much lighter than are usual in this country that the American practice of purchasing heavier and more powerful locomotives to handle increased traffic would have entailed complete rebuilding of road and structure. Not only would there be additional weight per axle, but the longer wheelbases would have required the straightening out of curves. This would have entailed prohibitive expense, and the same objection applies to the building of additional trackage, water stations, shops, roundhouses, turntables, etc., to accommodate an increased number of trains hauled by steam locomotives of the existing weight. Experience had proved conclusively that electric locomotives can provide the tractive effort for much greater trailing loads without increase of axle weight or of wheelbase, and can handle longer trains at higher speeds than the steam locomotive. This permits a material increase in the capacity

of the existing track, with substantially lower operating costs.

Weight on drivers is the measure of the effective working capacity of any locomotive. In the steam engine, this weight is not over 60 per cent of the total, including tender; in the electric freight engine, the entire weight is available for traction. The electric locomotive costs to build nearly twice as much per pound of effective weight, but a smaller number of units are required to handle a given freight tonnage, partly because of the higher and more uniform speed, and partly because the electrics need to be less in the shops or roundhouses. On the Chicago, Milwaukee & St. Paul Railroad, for instance, forty-two electric locomotives displaced 112 steam engines, and in many instances, the ratio would be considerably bettered. The comparative weight on drivers would not, however, be in the same ratio, but would probably average at least twice as great for a division with steam haulage as for electric. The first costs of the two types of locomotive, therefore, are not far apart, and that for the electric may actually be less.

The cost of the electric distribution system, including overhead and substations, is largely offset by savings in shops, turntables, roundhouses, water stations, and coal and ash facilities, which add, on an average, 50 per cent to the cost of the steam engines required. Excess investment in the electric structures is more than counterbalanced where the need of building additional trackage can be postponed for years by a reduction in the number of train movements.

Fuel Savings Through Electrification

As to economies in operation, records from this country and Europe show savings of 60 per cent to 70 per cent in the consumption of fuel for electric operation, and of 50 per cent to 75 per cent in locomotive repairs and engine-house expense, in addition to material reductions in crew wages. In most places in this country the fixed charges on the investment in power houses, substations and overhead lines nearly balance the reduction in fuel costs, but where the price of coal has run unusually high as in many sections here and abroad, or the cost of electric power unusually low as it is on the Milwaukee system, the total charges for power may be very materially lower. Moreover, in a country that must import nearly all of its fuel, conservation is of vital importance. In France, with water power available in the Alps, the Pyrenees and in the central plateau district, the possible savings in fuel and in power costs are tremendous. The engineers estimate that within twenty years the annual power consumption of the three roads mentioned, with electrification complete on 5,000 route-miles, will be about 2,260,000,000 kw.-hr., which will all be obtained from water-power development. The same power output from steam locomotives would require the burning of at least 6,000,000 tons of coal. With coal prices materially higher than they are in the United States, the direct money saving is an important item and the release of this fuel for industries in northern France of tremendous economic value. On the basis of the present traffic, the coal saving would be somewhat more than half of this total, and since the first divisions to be changed over will be those involving the greatest power consumption, on account of mountain grades, or because they have the heaviest traffic, the initial savings will probably be proportionately as great as the eventual.

The Readers' Forum

High-Voltage Locomotives in Europe

TECNOMASIO ITALIANO BROWN BOVERI

MILAN, ITALY, Jan. 30, 1923.

To the Editors:

Our attention has been drawn to the article on page 19 of your issue for Jan. 6, entitled "1922 Was a Good Year in the Field of Heavy Traction." In this it is stated that six 3,000-volt d.c. locomotives, nearly completed, will be the first machines of such high voltage in Europe.

We would call your attention to the fact that the Turin-Lanzo-Cérès Railway in Italy, constructed by our firm, has been operating for two years at 4,000 volts direct current. We shall, therefore, be obliged if you will correct the above statement in an early issue and publish some details of the Turin-Lanzo-Cérès Railway.

TECNOMASIO ITALIANO BROWN BOVERI.

[EDITOR'S NOTE:—The statement made in the article referred to by the Brown Boveri Company of Italy was not that the six locomotives mentioned were designed for the highest direct-current voltage used in Europe, but that "they will be the first 3,000-volt machines in Europe." This fact was considered of special interest in view of the use of that particular voltage in the United States and elsewhere. There was no intention in the review to compare voltages of different high-voltage electrifications. We feel, therefore, that our correspondent misinterpreted the statement made in the review.

We are pleased, however, to accept the suggestion made in the above letter and give some details of this interesting and important 4,000-volt d.c. electrification. This is done in an article elsewhere in this issue.]

Pioneers in the Development of the Engineering Association

BROOKLYN RAPID TRANSIT SYSTEM

BROOKLYN, N. Y., March 5, 1923.

To the Editors:

Anent your editorial on the history of the American Electric Railway Engineering Association, appearing in the March 3 issue, it is suggested that some steps be taken to compile a complete roster of those present at the meeting held in the power station in Detroit in 1902, when the association had its real beginning. As additions to the list it should be noted that G. W. Palmer, former vice-president, stated at the recent Chicago convention that he was present and the writer also subscribes his name as being among those who were on hand.

It may not be out of place to add that for several years the association comprised only mechanical and electrical men, track men not being eligible to membership. About 1906, as I recall it, Past-President Fred G. Simmons started to organize a way engineers' association, and the writer had some correspondence with him about it. Ultimately the way men were permitted to join the mechanical-electrical group and the idea of forming a second, separate engineering society was abandoned.

R. C. CRAM.

New 180-Ton Passenger Locomotives for the New Haven

One of These Locomotives Will Be Capable of Hauling a 900-Ton Trailing Load, or Twelve Pullman Cars, Between Grand Central Terminal and New Haven in Ninety-nine Minutes at a Schedule Speed of 44 M.p.h.

BY W. J. CLARDY
General Engineering Department
Westinghouse Electric & Manufacturing Company

THE New York, New Haven & Hartford Railroad has in service almost 600 miles of electrified track, including some of the busiest main-line and yard trackage in the world. Yards at Oakpoint and Westchester are served entirely by electric switcher locomotives.

The present electric motive power consists of 106 Baldwin-Westinghouse locomotives, fifty-two for passenger, thirty-eight for freight and sixteen for switcher service. There are also thirty-five multiple-unit motor cars. The first forty-one passenger locomotives, placed in service in 1906 and 1908, are of the 2-6-2 type and weigh 102 tons complete; the last five were built in 1919 and are of the 2-6-2 + 2-6-2 type, weighing 180 tons complete. Recently twelve more of this type were ordered.

Sixteen 80-ton, 0-8-0 type switcher locomotives were placed in service in 1912, and thirty-six 110-ton, 2-8-2 type road freight engines in 1912 and 1913. The first of the thirty-five multiple-unit motor cars were operated in 1909 and the last eight cars went into service in 1922. These cars range in weight from 84 to 91 tons complete with all equipment (no load) and are really locomotives, as each motor car is capable of hauling two trail cars.

The twelve passenger locomotives now under construction will be identical with the five placed in service in 1919, except for some refinements in minor details. They will be equipped with six twin motors and will operate from an 11,000-volt, single-phase trolley or a 650-volt, direct-current third rail. The gear ratio will be 25 to 89, and the drivers will be 63 in. in diameter. Each engine will have two pantographs and four third-rail shoes for current collection. Of the total weight 122 tons will be on drivers.

The new locomotives will rate 2,016 hp. They will develop 23,200 lb. tractive effort at 32.6 m.p.h., the continuous rating being 15,800 lb. at 39.4 m.p.h. The high-speed rating will be 2,424 hp. at 45.5 m.p.h. and 19,900 lb. tractive effort. A maximum momentary tractive effort of 52,500 lb. will be available and the normal accelerating tractive effort will be 36,200 lb. A maximum speed of 66 m.p.h. may be attained with safety.

The mechanical parts of the engine involve an interesting feature in that the frame is a one-piece steel casting for each half of the running gear. That is, there are but two frame castings per locomotive and these are the largest integral castings ever made for a locomotive, each weighing 18,000 lb.

The quill drive and details are the same as on the present locomotives and this type of flexible drive has proved very successful.

The 409 C-2 twin motor, which will be used on the new locomotives, rates 336 hp. at 275 volts for one hour and 276 hp. continuous at the same voltage. It is of the series commutator type with a resistance lead winding in the armature, and compensating windings on the field. A twin motor weighs approximately 13,000 lb., including bases, axle caps, axle bearings, dust guards, commutator lids and gear cases.

The a.c.-d.c. control equipment will be of the Westinghouse unit-switch, pneumatically-operated type, the entire control of an engine being handled by twenty-eight switches. This is accomplished by connecting the motors in four permanent groups of three armatures in series. The switches are arranged in three groups: motor switches, transformer switches, and resistance switches. There will be three starting and nine running notches obtained by means of voltage taps on the transformer.

Series-parallel control is not provided for direct-current operation as sufficient speed can be obtained when three motors are connected in series. A field shunt, which is effective on the last controller notch, will give the speed that is necessary in the d.c. zone.

The airblast transformer will weigh 15,300 lb. and rate 2,100 kva. Storage batteries (used on alternate days) will provide energy for operating the control switches and a motor-generator set will charge the batteries. Each locomotive will be equipped with an oil-fired flash boiler and the necessary oil and water tanks. The boiler will have sufficient capacity to heat a twelve-car train.

The 180-ton locomotive permits the handling of all the heavy passenger trains with a single engine. The heaviest of the express trains consist of twelve Pullman cars of 75 tons weight each, or a trailing load of 900 tons. This locomotive can haul these trains between Grand Central Terminal and New Haven in 99 minutes on a non-stop run, a schedule speed of more than 44 m.p.h.

The five 180-ton passenger locomotives that have been in service the past four years frequently make over 500 miles per day, the longest single trip being 72 miles. A number of the forty-one original passenger locomotives of the 2-8-2 gearless type (0-1 to 0-41) have now made over 1,000,000 locomotive-miles and the others are very close to this figure. This is the result of sixteen years of successful oeration.

In concluding the writer would call attention to the fact that in the design of passenger locomotives for the New Haven, the weight is limited to 181 tons complete with all details including sand, water, oil and crew. This restriction is imposed on account of the Park Avenue Viaduct in New York over which passenger trains run when entering the Grand Central Station. Further, the locomotives must be designed for direct-current operation from a 650-volt third rail to permit running on the tracks of the New York Central. This, of course, complicates the control apparatus.

Atlanta Window Poster

BETTER TRAFFIC LAWS
would bring better street car
service to the
250,000 who depend
upon the street cars daily

The Georgia Electric Railway is carrying this poster to help the campaign for better traffic laws in Atlanta.

Association News & Discussions

General Accounting with Bookkeeping Machines*

Machines Are Used to a Great Extent in the Accounting Work of This Property—An Analysis of the Operations and Advantages Over Hand Bookkeeping Are Given

By R. R. PEERY

Chief Clerk Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind.

THE use of mechanical appliances in the office is becoming more general. The typewriter and ordinary adding machine are now considered a necessary part of the equipment for practically every office, and the bookkeeping machine is rapidly making a place for itself. Our equipment consists of two 11-in. bed, Elliott-Fisher bookkeeping machines equipped with crossfooter and four seven-digit registers on each machine.

FORMS USED AND HOW MACHINES ARE USED WITH EACH

Invoices—Vouchers and Accounts Payable Ledger. Approved invoices, after they have been audited by comptometers and a predetermined total taken by listing on the adding machine, are posted to the distribution ledger. Proof sheets are made of such postings for checking purposes and are retained until the end of the month, after which they are destroyed. At the close of the month these invoices are accumulated by firms, and a total is made. The distribution by control accounts is filled in on the lower portion of the voucher in ink, and the voucher is numbered. with month and year given, and is passed to the operator for completion.

The operator then proceeds to write the check, remittance statement and voucher and post the accounts-payable ledger in one operation. The voucher number is written in the last column for reference in the accounts-payable ledger. One add register is used to prove that the items listed are correct, and the total is written in the second column from the right, which is a subtract register and clears the crossfooter. Checks for payment of loss and damage claims are made on a special form and are posted to the accounts-payable ledger by the same operation. Proof sheets are made of these checks and are attached to the voucher at the end of the month, covering all payments of this nature made during the month.

The accounts in the ledger are arranged alphabetically by name of creditor. As payments are made, the bookkeeper enters the amount of such payments on the cash book and the operator from time to time posts all the payments to the accounts-payable ledger immediately below the amount of voucher, giving the check number. A proof sheet of these postings is made, showing each entry, and the total is accumulated, which agrees with the total cash disbursed.

Distribution Ledger. The distribution ledgers are kept in a vertical tub file or desk, and are divided into control groups, numerically under each group. There are from twenty to 200 accounts in each division. In other words, the accounts in the first control are numbered consecutively, 1 to 28, "Way and Structures," those in the second, 29 to 44, "Equipment," etc. Payroll, store requisitions and invoices (vouchers) are posted at separate runs.

Store Requisitions. Material issued at the storeroom is entered on requisition forms which are assorted daily by operating account numbers and entered by the storekeeper to a disbursement sheet and forwarded to the auditor's office periodically according to the size of the storeroom—weekly, semi-monthly or monthly as the case may be. These sheets are audited by comptometers for errors in extensions and additions and are then arranged according to the account number and passed to the operator. The operator first posts to "Way and Structures," then to "Equipment" and so on. When she has posted all the stores on "Way and Structures" or the first control, she transfers the total to the next column which subtracts from the crossfooter and leaves the machine clear. This transfer shows on the proof sheet only. The totals in this register are accumulated until the entire run is completed and verification made against an adding machine total.

By handling the work in this manner we get a total separately and collectively. At the end of the month these proof sheets are recapped by storerooms and used as a journal entry.

Payroll Distribution. The distribution of the payroll is made by the head of each department, and the accounts are arranged on the sheet in numerical order. After being verified against the total of each payroll they are passed to the operator for posting. The postings are made as with the stores' requisitions. A proof sheet is made of this work by payrolls, and from the summarized totals, the journal entry is made at the end of the month.

Invoices (Vouchers). When vouchers are posted, no division is made by controls, but as the postings are made the amount for each account, as shown by the crossfooter, is thrown out into the last column on the right, and is allowed to accumulate in the register so as to give the total for the run. This grand total must agree with the predetermined total, proving the correctness of the postings. As all the work is handled by separate runs, only one adding register is necessary for the payroll, store and voucher columns.

Balancing. At the end of the month the various columns on the distribution ledger are added and proved against the total amount of the requisitions and payroll. The total of the vouchers is proved against the voucher register control, which is kept by the bookkeeper.

Payrolls. Department time sheets are made up twice each month, are assembled in approximately the same order as each payroll period, and the rates checked against the previous payroll (except for trainmen whose rates are checked against the trainmen's roster). Deductions are shown, such as time orders or advances against salaries, and other miscellaneous items, as well as the number of the check in the first column on the payroll sheet. The sheets are then passed to comptometers for adding total time, verification of extensions, and addition to arrive at the total payroll. The time sheets are now ready for the operator.

Pay checks for about 1,800 employees are written from these time sheets (the checks being dated and numbered previously by a combination numbering and dating machine), showing the amount earned, time orders, other deductions, check number and amount to pay. A proof sheet in duplicate is written at the same time. One copy accompanies the checks to the department head and the other is kept as a permanent payroll record. The machine automatically takes care of deductions, "time orders" and other items and the amount to pay is computed by the crossfooter, which latter amount when written on the check clears the crossfooter and a star is shown proving the operation to be correct. As the amounts are written in different columns on the check, four registers are used, and the totals are subtracted from the registers as each payroll is completed. This form of check is not

*Abstract of paper presented at the annual meeting of the Central Electric Railway Accountants' Association, Lima, Ohio, Feb. 23-24.

universally used but the banks do not object to it. An actual test showed the operator was able to write 1,793 pay checks, which constitutes an entire payroll, in eleven hours.

Earnings Reports. Eleven copies of a daily earnings report are made and proved to be correct. The machine figures the increases and decreases as the amounts are written in the first two columns, namely, "this year" and "last year." It also furnishes the column totals at the same time.

Conductors' Overs and Shorts. A daily record of conductors is kept, giving the total charges, amount remitted and net amount over or short, as the case may be. Three registers are used for these postings. The first register accumulates the total debits, the second the total remittances and the third the net amount over or short. This work is proved against the total of recapitulation of conductors which gives the total for each division.

Accounts Receivable. Various departments advise this office of material sold and labor performed for individuals and companies, as well as charges against the United States government for transportation furnished, and a bill is promptly made in duplicate. These bills are then posted to the proper firm and an entry is made on the statement at the same time. The statement is the original and the ledger sheet the carbon copy. Four registers are used for this work, one for each column on the sheet. At all times we know the exact amount due, and this plan enables us to mail statements promptly at the end of each month. A proof sheet is made of all postings, both debits and credits. The debit postings less credit memoranda issued are proved against the total of the invoice register and cash credits are proved against the cash book.

In conclusion I might say that with the use of bookkeeping machines we have eliminated a lot of possibilities for errors such as illegible figures, incorrect postings that can be found only by checking back the work for the entire month, etc. We have found that they are more economical than the hand method of bookkeeping.

Commission Engineers Hold Conference

Decide in Washington on Annual Meeting, Also Discuss Grading of Utilities for Efficiency

PLANS for an annual conference of engineers attached to the state utilities commissions, to be conducted under the auspices of the Bureau of Standards, were laid at a meeting at the Department of Commerce March 2 and 3. It was the consensus of opinion of the engineers of more than one-third of the state commissions that there should be an annual conference at which the technical and enginering questions involved in utility operation could be discussed in the interest of the common good.

This conference was called by Dr. F. C. Brown, the acting director of the Bureau of Standards. The conferences are to be along the lines of those which have been in progress many years in which the specialists of the bureau meet with the weights and measures officials of the various states with the idea of exchanging views and experiences. In addition to the benefits which will come from the exchanges of views among the utilities engineers, it will give them an opportunity to secure first-hand knowledge of the experiments and research which the bureau is conducting on the public utility problems.

An executive committee was selected to work out plans for future conferences. C. B. Hayden of the Wisconsin commission was chosen as the chairman of the executive committee and E. C. Crittenden, chief of the Electrical Division of the Bureau of Standards, its secretary. Other members selected are: William M. Black of the Maine commission, C. R. Vanneman of the New York commission and A. I. Thompson of the Oklahoma commission.

Secretary Hoover, in opening the conference, pointed out how necessary it is to promote uniformity and to prevent duplication of effort. Such gatherings of engineers, he declared, give an opportunity for each one attending to benefit by the accomplishments of others.

Commission engineers who attended the conference were: Alabama, I. F. McDonnell; Georgia, J. Houstoun Johnston; Illinois, J. Howard Mathews; Indiana, Earl L. Carter; Iowa, A. B. Campbell; Maine, William M. Black; Maryland, H. C. Wolf, W. F. Strouse, S. A. Covell, Mr. Cullen, L. Ellis, R. Y. Gildea and J. L. Wicks; Michigan, Manfred K. Toeppen; New Hampshire, D. Waldo White; New Jersey, Col. P. Betts; New York, C. R. Vanneman and R. H. Nexsen; Ohio, L. G. White and Ward Snook; Oklahoma, A. I. Thompson; Tennessee, F. G. Proutt; Virginia, J. W. West, Jr.; West Virginia, James Imboden and W. B. Hall; Wisconsin, C. B. Hayden; District of Columbia, E. G. Runyan, and Connecticut, A. E. Knowlton.

STANDARDS FOR GRADING GAS AND ELECTRIC SERVICE

Subject	Credit — Gas, per Cent	Rank	Credit — Electric, per Cent	Rank
Creeping meters	..	..	4	6
Accuracy of meters	7	4	7	3
Installation tests	..	..	5	5
Periodic tests	14	3	14	2
Meter testing records	5	6	5	5
Meter testing equipment	5	6	5	5
Request tests	4	7	4	6
Referee tests	..	..	..	..
Meter readings on bills	4	7	4	6
Heating value	21	1	..	..
Calorimeter equipment	7	4	..	..
Interruptions	..	..	18	1
Station records	..	..	6	4
Pressure and voltage variation	18	2	18	1
Pressure and voltage surveys	6	5	6	4
Purity	4	7	..	..
Complaint records	5	6	..	..
Information	..	..	4	6
	100		100	

Grading Public Utilities

At the meeting C. B. Hayden, assistant engineer Wisconsin Railroad Commision, read a paper entitled "Grading Utilities in Conformity to Service Rules." While the paper indicated that no criteria had been established yet for railways and the study had been confined to gas, electric and telephone utilities, the address is of much interest to railway men.

The speaker said that the first order issued by the Railroad Commission of Wisconsin prescribing certain requirements for gas and electric service was made effective in 1908 and the second order, which is now in effect, was issued in 1913. Very soon after the last order came out the service department began grading the gas and electric utilities, and about a year later, in 1915 or 1916, the telephone utilities were given standings. It was not the thought when this system of grading was started of applying it in the way used in schools, where it is necessary to keep the pupils placed according to the achievements which each makes, nor was it expected that each utility would pass or secure honor marks through the various years of the course, with a possibility of failure up to the final graduation. It was done because it afforded a means of keeping track of the utilities according to the service standards which had been established, and if possible to determine whether there was any increase or decrease in the degree of compliance, from year to year, of the utilities throughout the state or of any one in particular.

After use in this way for some time, it was determined to try out the scheme on the unsuspecting utilities, and it was found that the results were decidedly good. The utilities which received high rank were very much pleased, and in most every case put forth effort to improve their position or maintain it in any event. To be sure, some jealousy developed, but for the most part the best of feeling existed and a friendly rivalry developed for the high rank position.

The weighting of the various standards for gas and electric service was decided after a number of conferences of all the inspectors, and it is believed that the result is reasonably proper. For gas service, the heating value of the gas is given first place in importance, pressure variation second, periodic meter tests third, accuracy of meters and calorimeter equipment fourth, and the balance of the standards of about equal value. For electric service, interruption and voltage variation hold first place, periodic tests second, accuracy of meters third, and the balance of the standards of about equal value. The accompanying table gives an idea of the plan.

The speaker then gave the wording

and an explanation of the rules or standards of each of the subjects in the table.

A somewhat similar set of standards was prepared for the telephone companies. In conclusion, the speaker said, in part:

"For the last few years the service requirements imposed by the Wisconsin Railroad Commission have been tempered materially because of the difficulties which have been the lot of all public utilities, and doubtless this condition has been prevalent throughout the country. Special cases, which have arisen because of the conditions resulting from the war, have engaged largely the time of our engineers, so that the personnel of the staff was not sufficient to handle the service matters thoroughly and do the extra special work. For these reasons the work of grading the utilities has not been complete, i.e., while grades have been given with their reports on all inspections, it has not been possible to make the inspections of all the localities, and therefore comparative summaries have not been made for two or three years. We are getting caught up again, though, and will have our summary of the gas companies again, for this year, for inspection by the utility representatives at the gas and electric association convention this month.

"It is our opinion that the practice of gradings has been of great value and aid to the department and has been generally looked upon favorably by the utilities."

Talks on Management and Operation

Railway Club Members Hear an Explanation of the Electric Railway Situation in and Around San Francisco as Presented by Three Executives of Important Local Properties

AT THE Feb. 8 meeting of the Pacific Railway Club in San Francisco three talks were made dealing in a general way with the problems that, in one form or another, continually confront electric railway executives. The speakers of the evening were: Fred Boeken, superintendent Municipal Railways of San Francisco; M. McCants, assistant general manager Market Street Railway, and J. P. Potter, superintendent of transportation San Francisco-Oakland Terminal Railways. Abstracts of the three talks are given in the following:

Mr. Boeken's Address

On the subject of developing traffic, Mr. Boeken pointed out that one of the peculiarities of San Francisco's problem is that its location on the tip of a peninsula limits its future growth to one direction, i.e., down the peninsula. In commenting on some of the schemes for increasing revenue he said:

"The European zone system of fare collection, which has been introduced in a few places in the United States, might properly be termed a traffic-developing measure. While no doubt the main object of the zone system of fare collection is more nearly to equalize the distance traveled for the amount paid, whether it develops any more car riders or not, if properly worked out it should at least produce more revenue."

He referred to an innovation now being tried out in southern California by a merchants' association whose members sell street car tokens with free coupons to their customers, the tokens being accepted by the street car company at the regular rate of fare and the coupon being accepted by the merchant on goods purchased. These tokens are accepted only in the off-rush period. On store purchases amounting to $1 the saving by the use of the coupons is 8 cents, or a little over half the round-trip fare.

Another somewhat similar method, known as the Prole system of coupon transfer, he said, provides for a discount of 5 cents on a dollar's purchase. Both these schemes seemed to Mr. Boeken to involve danger of incurring the ill will of small storekeepers in the outlying districts.

Depreciation as affecting changes from one type of equipment to another is a subject that requires careful attention. Changes were rapid up to the electric stage of operation, the larger cities are being forced to elevated or subway construction, the radical change from one-man horse-drawn cars to expensive two-man electric cars has been succeeded by a trend toward a lighter one-man car again, and there is by no means assurance that other radical changes may not be necessary in the future. "The method of figuring depreciation used by the Municipal Railway," he said, "requires the setting aside of 14 per cent of the gross revenue for depreciation and bond redemption. In our case this seems to be ample as we have a large car-hour revenue." In view of the heavy costs of operation at present and the uncertainties of the future, Mr. Boeken did not believe that any street railway would be in danger of setting aside too much in a depreciation fund.

On the subject of competition, Mr. Boeken pointed out that during the pioneering days of a city's development competition may have much to do with hastening development and bringing service and rate of fare to a reasonable standard. Generally speaking, however, it would seem to be far better for the public to have the right to regulate service for all than to have certain districts "over-served," to the detriment of other districts not so fortunate as to have competition—a waste of service in one locality must be offset by a saving somewhere else. Then, too, competition in electric railways is confined to a narrow strip on either side of a line, and better service in one section is unlikely to be of advantage to residents of other sections.

Mr. McCants's Address

In discussing the subject of headway and rush hours, Mr. McCants stated that it is a maxim in street railway management that 10 per cent of the passengers in any day of twenty-four hours will be hauled between 8 and 9 a.m. and 14 per cent between 5 and 6 p.m. As a result, the headway must be very short at rush hours, and then it must be quickly lengthened as the traffic dwindles in volume.

Even where large factories or mills are willing to co-operate to the extent of "staggering" work-hours so that large numbers of employees will not be dismissed at exactly the same time, it would be virtually impossible to limit the load in each car to seating capacity only and still get the rush-hour crowds home in an expeditious manner. Uncomfortable though it may be to stand, rush-hour passengers must accept this condition. The attempt in Berlin to carry only passengers for whom there were seats has been anything but satisfactory; in Rome all seats are removed at the rush hour and everybody is obliged to stand.

After pointing out how radically the operation of jitneys is opposed to the interests of the common weal, Mr. McCants said: "Street railways have long been regarded as a monopoly and therefore subject to regulation. They have submitted to that regulation, and in the face of such regulation have seen such irresponsible competitors as jitneys enter the field. There is, therefore, no escape from the logic of this thesis—that if the street railway is no longer to be a monopoly, it should no longer be subject to regulation."

The highly beneficial influence of public parks should be utilized to a greater extent, and the chief need in accomplishing this end is an effective means of "selling" the parks, not only to tourists and other visitors but to residents of the city themselves. There should be more extensive and more intelligent advertising.

Greater simplification of systems of transferring and in the transfers themselves are urgently needed. Stopovers and other improper use of transfers must be prevented if the railway company would avoid serious losses. For example, one company tried out its system by sending out agents to ride as long and on as many lines as possible for one fare. One agent rode all day on the same fare and ended his day by cutting out of a newspaper advertisement a slip with the same shape and size as the regular transfer. He presented this scrap of paper and it was accepted. His report to the management, backed up by the reports of the other agents, resulted in a new transfer system and an estimated saving to the company of $1,000 per day.

On the lines of the Market Street Railway the number of transfers issued

does not increase as rapidly as the number of passengers carried. This may indicate either or both of two things: First, that the transfer system is being operated with increasing efficiency, and, second, that the people are being educated to saving time by taking more short trips.

The law of diminishing returns, in effect, says: "Do not devote all your attention to keeping the operating expenses of your business down to an absolute minimum; instead, try so to conduct your business that it will give the greatest possible profit on the capital invested." If city fathers would properly apply that law they would ask themselves: "If the street railways are not held responsible for the upkeep of the paving between and beside the tracks, how far will they go in the construction of extensions? If an exclusive right-of-way is granted on Blank Street, how much faster service can we demand? What is the ultimate dollar value of all such improvements?"

Painstaking research on the part of the electric railway company in the matter of selecting personnel is very much worth while. The attention of the Market Street Railway to this subject, Mr. McCants thought, has a direct relation to the fact that the turnover of men employed by that company is now only 21 per cent per annum and that within the past four years the ratio of passengers to accidents has been increased 65.3 per cent.

Again, the platform men can do as much toward "selling" the city to visitors as would an extensive advertising budget. When the columns of the daily press are used to educate the public the effort is labeled "propaganda." There is no other agency nearly so potent in educating the public and creating general good will as an army of enthusiastic employees who render effective service cheerfully and boost for the "company."

MR. POTTER'S ADDRESS

Transportation systems on the east side of San Francisco Bay, Mr. Potter pointed out, extend from Richmond on the north to Alameda on the south, an area of approximately 72 square miles, with a population of about 360,000 people. Rail systems include three transcontinental steam lines, the electrified division of the Southern Pacific, the Sacramento Short Line and the system of street railways operated by the San Francisco-Oakland Terminal Railway. The combined local and interurban system trackage totals 369 miles in length, probably the most comprehensive system of transportation of any city in the United States comparable in size and population.

The demand for express or restricted service from the different municipalities, particularly between residential and business districts, is becoming more pronounced as the population increases and the peak hours of travel grow heavier. At the same time the possibility of providing restricted stop service is becoming more limited by congested traffic. As the morning and evening peaks increase the large number of units necessary to move the traffic materially slows up schedules.

In endeavoring to find some relief attention is being given to the possibility of multiple-unit control with a seating capacity of not less than fifty passengers, using cars equipped with automatic couplers and operating in two or three car units.

The Key Route transbay service is largely rush-hour business, and of the average haul of 42,000 passengers per day in 1922 on the transbay system 46 per cent rode during a two-hour travel peak. Because of this condition it was necessary to provide an average of two seats for every passenger. On the ferry system the provision was more than three seats for each passenger transported. The combined Key Route and Southern Pacific systems operated more than 54,000,000 vacant seats last year; this, despite the fact that in 1922 the Key Route had the heaviest travel since 1915 (the year of the Panama-Pacific International Exposition). These figures were cited to show how the rush-hour one-way service loads up the system with "return empty" hauls. This does not indicate the provision of more seats than absolutely necessary. An accurate log or train chart of every train, car and boat is kept to show just how much the seating capacity is above or below the demand.

Illinois Electric Railways Association

THE Illinois Electric Railways Association will hold a joint meeting with the Illinois Gas Association and the Illinois State Electric Association at the Hotel Sherman, Chicago, on Wednesday and Thursday, March 14 and 15. The morning sessions will be joint meetings and the afternoon sessions will be separate meetings for each association.

The following will be among the speakers at the morning sessions: Charles M. Thompson, dean College of Commerce and Business Administration, University of Illinois; Ralph E. Heilman, dean Northwestern University School of Commerce; Martin J. Insull, vice-president Middle West Utilities Company; Britton I. Budd, president Chicago Elevated Railroads; E. W. Lloyd, chairman N.E.L.A. Joint Committee for Business Development; George R. Jones, chairman Illinois Committee Public Speaking Bureau; E. Hill Leith, Halsey, Stuart & Company; B. J. Mullaney, director Illinois Committee on Public Utility Information.

The following papers are scheduled for presentation at the railways section: "Future of the Electric Railway Business," by W. H. Sawyer, East St. Louis & Suburban Railway; "The Sale of the Ride," by Walter Jackson, consultant, New York City; "Advantages of Americanization of Railway Employees," by C. B. Goodsell, Chicago, North Shore & Milwaukee Railroad; "The Manufacture of Railway Equipment," by C. E. Thompson, Chicago, North Shore & Milwaukee Railroad; "Paving," by John B. Tinnon, Chicago & Joliet Electric Railway; "Stores and Inventory Methods," by a representative of the Bureau of Commercial Economics.

The joint annual banquet of the three associations will be held on the evening of March 14 at the Hotel Sherman. Charles A. Luther, Peoples Gas Building, Chicago, is chairman of the banquet committee.

C.E.R.A. Meeting in July

IN THE summary of association meetings scheduled for the next few months, which was printed in the ELECTRIC RAILWAY JOURNAL for March 3, page 374, the date given for the Central Electric Railway Association summer meeting was that originally announced. Since the first announcement a change in the date has been necessary, the date of the meeting now being July 18, 19 and 20.

New England Street Railway Club

THE annual meeting and banquet of the New England Street Railway Club will take place on Thursday, March 22, at the Copley-Plaza Hotel, Boston.

At the banquet George W. Gardiner, vice-president of the Union Trust Company, Providence, will act as toastmaster. The speakers scheduled include: His Excellency Channing H. Cox, Governor of Massachusetts; Hon. James M. Curley, Mayor of Boston; William H. P. Faunce, D.D., LL.D., president of Brown University, and Robert H. Newcomb, executive assistant Boston & Maine Railroad.

American Association News

Committee of One Hundred

THE executive committee of the Committee of One Hundred met in New York on March 5. The committee listened to a report of the joint committee of the publicity committee of the Committee of One Hundred and the advertising section of the association's Bureau of Information and Service, and thereafter approved a plan for soliciting funds with which to carry on the work of the Committee of One Hundred. The plan adopted is practically the same as that by which funds were raised when the Committee of One Hundred was first organized. Each member company of the association will be requested to contribute an amount equal to 50 per cent of the annual dues paid the association. This plan was brought before the committee by the sub-committee on finance, of which Randall Morgan is chairman.

Those present at the meeting of the executive committee were the chairman, General Guy E. Tripp, and C. D. Em-

mons, J. H. Pardee, L. S. Storrs, F. R. Coates, Henry R. Hayes, Gen. George H. Harries, J. N. Shannahan, J. H. Choat, O. D. Young, and J. W. Welsh, Labert St. Clair and J. W. Colton.

Publicity

AT ITS meeting held on March 5 the American Association committee on publicity spent most of its time hearing and discussing a report from Labert St. Clair on the work of the committee of 100. The committee also considered plans for countrywide publicity for those features of the electric railway situation on which general information seems now to be particularly needed. The committee was fortunate in having President C. D. Emmons in attendance. F. R. Coates, chairman, presided, and the meeting was also attended by J. N. Labert St. Clair and J. W. Colton.

Revised Transportation & Traffic Rules for City Operation

THE standard code of rules of the Transportation & Traffic Association for city operation, which were revised at the last convention primarily to extend their range to cover the operation of one-man cars, are now being reprinted in suitable pocket-sized form. They can be had in bound form, with the association's standard cover, or unbound to permit the use of a special cover and additional inserts if desired by a local company.

Problems of the Purchasing Agent and Storekeeper

THE Engineering Association committee on purchases and stores met in New York City on March 5, with almost a perfect attendance. Those present were B. J. Yungbluth, chairman; W. S. Stackpole, vice-chairman; W. C. Bell, J. P. Dick, J. F. Fleming, W. N. Ford and H. H. Lloyd.

A report was received from a subcommittee appointed to prepare proper instructions for putting into effect the approved "Materials Classification." A meeting of this sub-committee had been held in Baltimore on Feb. 15. As amended by the main committee, this report is as follows:

For the proper operation of a "Materials Classification" it is recommended that all items of material handled by or through the supply or stores department be designated by a class number.

All such items should be divided into the various classes as shown in the "Materials Classification" and then an inventory taken to establish the money value of material in each class, after which, in order to maintain the classification, it will be necessary to keep a record of receipts and issues under each material class listed, and to make statement of total values monthly.

The class to which material is to be charged or credited should be designated by the storekeeper, by notation against each item on stores requisition on purchasing agent, invoice, storeroom report of material received and storeroom report of material issued. The class number should be used on every transaction, and record of each item which is kept in stock. Especially ordered material not charged to supply account, need not be classified unless desired.

As a matter of convenience to the storeroom force in fixing the class to which any article belongs, some companies using "Materials Classification" find it desirable to use a numerical numbering system. To accomplish this, it is recommended that all items subdivided under each class be arranged in alphabetical sequence, writing the noun first and further description after the noun, as, say, in Class No. 31.

Arms, pressure, for GE-57 brushholder.
Arms, pressure, for GE-200-J brushholder.
Blocks, brush yoke, for WH-101 motor.
Caps, axle bearing, for WH-307 motor.
Shafts, armature, for WH-514-C motor.

After this has been done an individual class number should be applied to each item of material, the first two figures of this class number to be the same as, and to represent, the class to which the material belongs, the remaining figures to designate the numerical position of the item in its class. As an example, say, in Class No. 17, individual numbers applied to machine bolts might be as follows:

Bolts, Machine

Class No. 1772	⅜ x	2½ in.
Class No. 1773	⅜ x	3 in.
Class No. 1781	⅝ x	5 in.
Class No. 1782	⅞ x	5½ in.

In assigning class numbers sufficient space should be allowed between numbers to provide for additional items which may be added to the material classification from time to time. In this connection it is advisable to handle the numbers in groups for each kind of material, such as assigning class numbers 1,700 to 1,799 to machine bolts, 17,200 to 17,259 for lag screws, etc.

As a form for a monthly statement showing the transactions in classified material, reference is made to Exhibit B as shown in the 1921 report of the committee on stores accounting, and the samples submitted herewith, being those used by the United Railways & Electric Company of Baltimore and Public Service Railway Company, New Jersey, as being typical ones which might be adopted with such modifications as may be deemed necessary to suit the needs of any individual company.

Supplemental detailed forms necessary to prepare this statement can be designed by companies to meet their requirements.

In this connection it was decided that a joint meeting with the stores accounting committee of the Accountants' Association would be desirable for the purpose of obtaining agreement with that committee on the method of putting into effect the proposed materials classification and agreement with regard to inventory methods. An endeavor will therefore be made to hold a joint meeting, and June 4 or thereabouts was selected as a desirable date on account of the convention of the National Electric Light Association, which will be held during the week of June 4.

The committee then discussed in detail the preliminary program for the special session of purchasing agents and storekeepers which will be held at the coming annual convention. There will be papers by prominent storekeepers and purchasing agents, with prepared discussions by carefully selected speakers. The meeting will be given special publicity to show a good attendance.

A large part of the meeting was taken up with the subject of periodic inventories, with debates on the relative merits of the stock book form presented at the 1921 convention by the joint committee on stores accounting, the perpetual inventory system and other methods of control. As the committee was not prepared to vote unanimously in favor of the stock-book plan, a vote was not taken with regard to its general recommendation, but the committee will study the system with a view to reaching a unanimous decision prior to the joint meeting with the stores accounting committee.

The chairman appointed Messrs. Ford and Bell to collect data from a selected group of companies, so as to show the outstanding feature in connection with the investment in, and the control of, materials and supplies. A questionnaire will be used for this purpose.

One-Man Interurban Cars

THE practicability of the one-man car and plans for obtaining information from all parts of the country concerning its operation were discussed at a special meeting of the committee on one-man car operation of the American Electric Railway Association at the Hotel Gibson, Cincinnati, Feb. 19. Following the conference it was announced that the committee would send out questionnaires to all electric railways to obtain their opinions on the one-man car and the advantages and disadvantages of the light-weight car. J. P. Pope, general manager Kentucky Traction & Terminal Company, was chairman of the meeting, at which the following also were present: N. W. Bolen, H. C. DeCamp, J. E. Duffy, A. L. Reynolds, Karl A. Simmon, A. Swartz, L. G. Van Ness, A. E. Wood, A. H. Clifford and T. C. Cherry.

Following the meeting the committee was entertained with a dinner at the hotel by officials of the Cincinnati Car Company and the railway department of the General Electric Company.

Association Bulletins Available

SECRETARY J. W. WELSH states that the following reports and compilations are available to association members in good standing:

Working Conditions of Trainmen: A tabulation of the replies of over 250 companies to a questionnaire sent out in February, showing hours of labor, length and types of runs, overtime rates, extra compensation allowed for special work, number of trainmen employed, labor turnover, etc.

One-Man Car Legislation: A record of unsuccessful attempts by means of statutes, ordinances, etc., to prohibit the operation of street railway cars with one man; the second supplement to a compilation originally issued May 1, 1921.

Bus Franchises: A summary and analysis of the principal provisions of the franchises or permits under which electric railways are now operating buses.

Metal Fare Tokens: A list of 105 electric railways using metal fare tokens, with a photographic reproduction of the tokens used by each company, showing all types in use and both sides of each type.

Financial and Operating Statistics of Electric Railways for the Calendar Year 1922 as Compared with 1921: Gives the combined income statement of a large group of companies reporting to the association and their operating expenses subdivided into the primary accounts in totals and on a per car-mile basis. Also gives operating and traffic statistics from which certain significant ratios are calculated to indicate the underlying conditions of the industry.

Maintenance of Equipment

Maintenance of Car-Type Electrolytic Lightning Arresters

When Operating Troubles Occur They Point to Some Definite Cause That, in Most Cases, Can Be Overcome by Careful Inspection and Maintenance

BY L. R. GOLLADAY
Supply Engineering Department Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa.

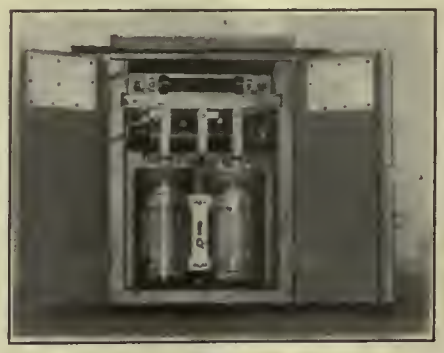
ALTHOUGH an electrolytic lightning arrester requires a certain amount of attention, it furnishes, when in good condition, a protection against storms that is unsurpassed. Consequently, if the original investment in this type of arrester was wise, it is only economic folly to lose the value of its protection by giving it insufficient or improper attention.

An electrolytic arrester for 600-volt street car service is shown in the accompanying illustration. In the top compartmenet of the case is the inclosed fuse, and in the lower compartment are the two balancing resistors and electrolytic cells. These three elements are the parts of the arrester that require the most careful attention. An arrester with a blown fuse has no protection value and, since this is the most common operating trouble, it should be examined first in the course of an inspection. The blowing of fuses can be largely avoided by charging the arrester each time it is placed in service.

The resistors should rarely cause any trouble. If one should develop an open circuit, it will usually cause the cell shunted by that resistor to overheat and perhaps boil out the electrolyte. This is an indication of a defective resistor. A resistor, broken by a severe shock, will cause such trouble.

The wearing parts of the arrester are the aluminum electrodes. Their life, as well as the protection, is increased by proper maintenance. Much care should be taken to see that the electrolyte is not contaminated by foreign matter. The electrolyte must be mixed with clean distilled water in clean glass or earthenware vessels that have first been rinsed in distilled water. The containers should not stand uncovered where dust can settle in the electrolyte. When handling the aluminum pieces, especial care should be taken that they do not touch anything.

When in good condition the electrolyte is clear and there is no sediment in the bottom of the cell. Brown spots on the cell plates do not indicate trouble in the cell. However, rapid corrosion and sludging are indicative of unsatisfactory conditions within



Westinghouse Type A. R. Arrester

the cells. After corrosion has once started it is not possible to stop it except by renewing the plates and electrolyte. The condition of the cells may be checked by measuring the leakage current with a milliammeter after disconnecting the resistors. If this current is much greater than 3 milliamp., the cell is not in good condition. The resistors take four or five times the current of the cells.

The life of the cell plates and electrolyte will be somewhat prolonged if the arrester is taken out of service in the winter season, which can be done if there is no lightning during this part of the year. Good results will be obtained if the electrolyte is removed from the cells and stored in an earthenware jar while the arrester is out of service. After allowing time for the separation of the oil and electrolyte, the former may be siphoned off and kept in a separate container. If the electrolyte is in good condition and kept covered, it can be used again. If the condition of the electrolyte is not certain, however it is better to use new electrolyte. When taking an arrester out of service the cell plates should be removed from the jars, cleaned with gasoline, rinsed in distilled water, and put back in the jars.

The life of the cell plates and electrolyte will be shortened by an unusually high operating temperature. For this reason it would be better to mount the arrester underneath the car rather than inside or on top of the car, where the temperature would undoubtedly be higher than is recommended for the satisfactory operation of electrolytic arresters.

Baggage Cars Converted for Passenger Service

THE New York, Westchester & Boston Railway has recently completed the conversion of two baggage cars into passenger cars. When these cars, Nos. 201 and 202, were originally built in 1911, they were designed for combined baggage and passenger use. A partition about one-third the way from one end of the car divided it into two compartments, the smaller of which was used for baggage. A separate door to this compartment was placed where the third window of an ordinary passenger car would have been. The larger compartment was fitted up in the usual way with upholstered seats.

Soon after these cars were built, however, the railroad entered into an arrangement with the Adams Express Company, which involved the handling of more express business than could be conveniently taken care of by the small baggage compartments in the two cars. All the seats were taken out of the passenger end and the cars used solely for baggage. They were operated in that way for a number of years until the arrangement with the express company was terminated as a result of the war. Then the cars were relegated to the storage yard and gradually stripped of most of their equipment. But the effect of the war, which first destroyed the usefulness of the cars, was later the reason for bringing them back into service.

A short time ago there developed

a need for more passenger equipment on the New York, Westchester & Boston. The cost of new rolling stock was prohibitive, and so J. T. Hamilton, superintendent of equipment, hit upon the expedient of converting the old useless baggage cars for passenger service. The partitions were taken out, bars removed from the windows, baggage doors replaced by windows and new seats installed.

In appearance today, inside and out, they are indistinguishable from the ordinary passenger cars. In spite of the fact that much expensive equipment which had been removed from the cars during their period of idleness had to be replaced, the cost of converting them was about one-fourth the cost of new cars.

Our Creed

To do a little better than is expected of us;

To be a little ahead of time rather than a little behind it;

To be as anxious to perform as to promise;

To furnish results and not excuses;

And, above all else, to remember that we are spending the company's money and not our own, and that we should therefore exercise more than ordinary care as to how we spend it.

This "creed," epitomizing the purpose of the department of rolling stock and shops of the United Railways & Electric Company of Baltimore, hangs in the office of A. T. Clark, the superintendent of those shops.

Convenient Babbitting Jigs

THE accompanying illustration shows some of the babbitting jigs used by the Eighth Avenue Railroad in New York, N. Y., for babbitting armature and axle bearings. The first and second jigs shown in the illustration beginning at the left are used for babbitting axle bearings. The two jigs shown at the right in the illustration are for babbitting armature bearings. These have a recessed base with an upright shaft in the center. The flanged ends of the armature bearings rest in the circular recess at the bottom. The base is provided with a handle for convenience. Of course, the complete circular portion is babbitted for armature bearings, while but one-half is babbitted for axle bearings.



Convenient Jigs for Babbitting Armature and Axle Bearings

The view at the extreme left shows the jig completely assembled and ready to pour the lining for a bearing. The next illustration shows the various parts. The base consists of an angle plate with a half round portion in the upright part of the same diameter as the armature shaft or the inside of the bearing after it is babbitted. The outside portion fits between the two fastenings shown at either side, and this is forced up close to the base by means of a clamping strip with a handle. A top plate is provided with an opening corresponding to the space to be filled with babbitt. This has a handle and by moving the plate across the end as the babbitt cools, a smooth end surface is produced.

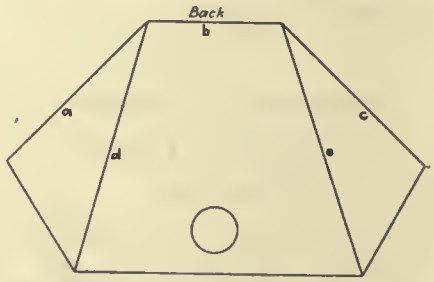
Platform for Washing Ventilator Glass

THE cleaning of cars of the New York & Harlem Railroad is under the supervision of the mechanical department. Car cleaning is done on a time basis, and the time schedule for cleaning ventilator glass and the clearstory of cars is an even multiple of that for washing the car bodies. In order to facilitate the washing of the clearstory, elevated platforms have been constructed on either side of the track used for bringing the cars into the shop for cleaning. Two men are stationed on these platforms to clean the ventilator glass and clearstory of cars due for this cleaning. This method permits of much better workmanship and better attention to the washing of the upper parts of the car bodies.

Fall River Shop Notes

THE Eastern Massachusetts Street Railway's Fall River division shops have recently been greatly improved. A visitor to these shops notices a number of little conveniences which conduce to economical maintenance. Some of these follow:

On a board conveniently mounted for the inspectors to examine are examples of well-worn and improperly-worn brake shoes, and other exhibits, which serve as a constant reminder as to how to get the most out of the wearing parts.



Canvas Cover for Protecting Sand Spout from Wheel Splash

In order to save space all material which can be stored overhead is so stored. For example, sweeper brooms are piled on a high shelf mounted between building columns. They are thus in plain sight, but absolutely out of the way.

An old single-truck car has been rigged up as a carhouse sand car, to facilitate filling of the sand boxes on the cars. Two longitudinal bins were built in this sand car, with openings at the side, closed with slides, to permit pails to be filled. The sand car is run alongside the drying room for filling, and is then moved about as required.

A home-made trolley pole tension tester has been found useful. It consists of a trolley catcher, suitably weighted. An iron handle is attached for convenience in carrying. A rope of length equal to that at which it is desired to test the tension is attached to the trolley catcher, which keeps it wound up when the device is not in use. When the end of the rope is hooked over the end of the trolley pole and the weight just balances the tension when the weight

clears the ground, the tension is correct.

It was found desirable to protect the spring sand spouts on the cars from wheel splash so that they would not become damp and clog the sand. For this purpose the spouts were covered with fire or other canvas hose and a canvas shield was slipped over the spout and tacked up against the bottom of the car. This shield is of the form shown in the accompanying diagram. It is tacked against the bottom of the car along edges *A*, *B* and *C*, being folded along the lines *D* and *E*. The back is toward the wheel, the front being open. For tacking up the canvas a tack driver consisting of a weighted rod sliding in a small piece of gas pipe was found convenient.

Reinforcing Outside Corners of Truck Pedestals

THE New York & Harlem Railroad, New York, N. Y., experienced some difficulty through the breaking of truck frames at the outside corner of the truck pedestal. This trouble has been overcome by reinforcing this point with an angle



Truck Pedestal Reinforced by Angle Iron and Welding

iron welded to the upright and split at the bottom so as to extend down the side of the truck frame. The center part of the angle at the bottom is bent back so as to lie on the top of the truck frame. A 3 in. x 3 in. x ½ in. angle is used. The accompanying illustration shows one of these side frames as repaired. The welding is done by the oxyacetylene process.

Old Axles Afford Very Useful Material

THE Market Street Railway of San Francisco has found so many uses for old axles that not only does it use all those taken from obsolete trucks of its own equipment, but the purchase of old axles from steam railroads has been found economical. The old axles are first heated in the oil furnace and then hammered out under the steam hammer to smaller diameter and greater length. This reworking materially improves the quality of the metal. It is used for filler bars in built-up crossings and frogs, tongues for switches, and for miscellaneous heavy forgings.

Trolley Rail Height Gage

OFTEN it becomes necessary to gage the height and alignment of the trolley or third rail. A mechanical device for this purpose has been used in the past with some degree of success. A new apparatus using a hydraulic principle is now used on the Chicago Elevated Railroads which has proved more simple in construction and more accurate in results.

A trolley board or shoe beam is equipped with a cylinder made of 1-in. brass tubing placed vertically through the board. The piston which operates in this cylinder has on one end a yoke or harp carrying two rollers 5 in. long by 2 in. in diameter. The piston is supplied with double leathers on its upper end. Suitable couplings and hose connections are made to the upper end of the cylinder and to a graduated glass tube properly mounted in the car. The system is filled with soap solution and calibrated.

The rollers ride upon the trolley rail, and the variation in height of the rail is transmitted through the liquid by the action of the piston in the cylinder to the graduated tube. A device of this type is placed on each side of the car in order to obtain readings on lap rail and special rail. Two observers in the car take readings at intervals of 200 ft. of track and also at high and low marks, and a recorder plots these readings directly on a previously prepared chart.

The ratio of the area of the piston to the area of cross-section of the glass tube is the determining factor in the degree of sensitiveness of the apparatus. After experimenting it was found that this ratio should be 1 to 1, that is, the diameter of the cylinder should equal the diameter of the graduated glass tube.

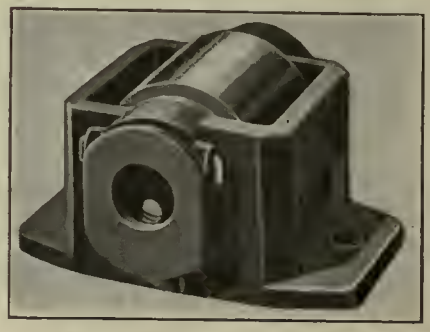
Records plotted by this method were checked and found to be more accurate, in showing the true conditions, than the foreman's rail height gage. As will readily be seen, this plotted record shows the height under operating conditions with the weight of the car on the running rail. A careful study of this record discloses conditions of the roadbed as well as of the trolley rail, and serves as a guide to reconstruction.

New Equipment Available

Continuous Roller Side Bearings

A NEW type of roller side bearing has just been placed on the market by the Burry Railway Supply Company, Chicago, Ill. The rollers and axles are of high-carbon steel, and malleable iron is used for the renewable bearing bushings, housing and wedges. The roller revolves on its axle and the axle in turn revolves in a renewable interlocked bearing bushing. This type of construction is intended to overcome trouble such as the wearing of an oblong hole in the housing, which of course lowers the roller and increases the side bearing clearance, thus making it necessary to renew such housings.

The new type bearing is being



New Continuous Roller Side Bearing

marketed under the trade name of "Paragon." The roller and the renewable bearing bushing have chafing flanges. These engage each other to prevent endwise movement. Outside endwise movement of the axle is resisted by the solid end of the housing. The renewable bearing bushings are designed so that the hexagon shape of the lower half fits in similar recesses in the housing, thereby preventing the bearing bushing from rotating with the axle, and as the surface of the bearing bushing engaging the recess of the housing is of generous width, all wear of the housing is eliminated.

The "Paragon" bearing bushings are easily renewed without removing the side bearing housings from the truck or body bolster.

The News of the Industry

Negotiations Suspended

Winnipeg Electric Railway Temporarily Withdraws Request for Franchise Extension

After twelve months of negotiating the Winnipeg (Man.) Electric Railway has temporarily withdrawn its request to the City Council for an extension of its franchise. The city of Winnipeg has the option in 1927 of purchasing the railway property. If it does not then purchase, the franchise is automatically extended for a recurring period of five years. Negotiations looking to an agreement deferring the period at which the city could take over the railroad property for ten years—until 1937—were undertaken by the company in order to enable it to do certain financing which would mean an extension of the transportation system in Winnipeg on a large scale.

A. W. McLimont, vice-president of the company, who personally conducted the negotiations with the Council, revealed his plans for a future transportation system that would keep abreast of the requirements of the city. The plans were finally incorporated in a draft agreement referred to previously in the ELECTRIC RAILWAY JOURNAL.

Among the concessions agreed to by Mr. McLimont in consideration for the extension was a schedule of lower fares, payment by the company of a share in the cost of building bridges and subways, placing wires underground in the business section of the city, adjustment of franchises in municipalities outside the city limits and a number of important extensions to track.

While this agreement met with the favor of the majority of the City Council, the labor group objected to the franchise question being dealt with at any time prior to 1927. This opposition protracted the negotiations.

Mr. McLimont said to the Council:

> The bankers take the position that the very determined and continuous opposition to the franchise negotiations by certain members of the City Council and from influential quarters elsewhere is very detrimental to the company's financial standing and credit, and on account of the long delay that has already taken place in negotiations, the uncertainty as to when the matter will be ended, what the final outcome will be, and the general conditions now prevailing in Winnipeg, the bankers seem very reluctant to consider any arrangement which would require them to provide for the large financial obligations involved and which would be necessary to carry out the program outlined in the draft agreement now before Council, and advise us to suspend negotiations temporarily.
>
> Another matter strongly influencing the bankers is the financial showing made by the railway department of the company for 1922, which was very disappointing. Conditions are not improving so far this year, and it would be impossible in the face of these conditions to justify putting into effect the fares proposed in the agreement.
>
> Under all these circumstances we feel that the only proper action to take is to suspend negotiations for the time being.
>
> After considering all phases of the situation the bankers intimated to me that they were prepared to consider providing us with sufficient money to meet our immediate and pressing obligations, and we now have negotiations pending with that end in view. When these are concluded we expect to take up the matter of our indebtedness to the city.

The company has been successful in effecting new financial arrangements and a special general meeting of the shareholders of the Winnipeg Electric Railway has been called for March 19, to consider and deal with a formal by-law authorizing a total issue of $5,000,000 of twenty-year 6 per cent general mortgage and collateral trust gold bonds of the company, of which there are to be presently issued $3,250,000. This amount will be disposed of in retiring the company's current indebtedness for capital expenditures and for general corporate purposes and will place the company in a splendid liquid position, with its interest charges less than they are at the present time. This issue has already been referred to in these columns. In 1921 this company found it necessary to provide additional electric energy to meet the growing demands of the company and organized the Manitoba Power Company, Ltd., to produce the required additional power. The Winnipeg Electric Railway is to be the distributor of this big power load, and in order to do so considerable money will have to be expended to install the necessary plant.

Orders Report of Salaries Paid

The California State Railroad Commission has adopted a resolution requiring all public utilities of the State to file salary data with the commission and furnish an accounting of donations, contributions, subscriptions and cash balances.

All public utilities having gross annual operating revenues of $100,000 or more must file on or before March 10 a statement showing the names of all officers or employees who during the year 1922 received a salary of $5,000 or more annually. The statement must include the salary paid, expense account, fees received by and duties of each such officer.

Public utilities with revenues of $25,000 and less than $100,000 are directed to file with the commission the names and salaries of all employees receiving $3,000 or more annually, with details as to fees, expenses and duties.

The commission's resolution also provides that all public utilities having gross annual operating revenues of $25,000 or more shall file on or before March 10 a statement showing the amount of cash they had on hand for all purposes on Dec. 31, 1922, the names of banks or other institutions with which such cash was deposited, the rate of interest received, and the amount of cash in the utility's treasury.

Appeal Dismissed

The Seattle Municipal and Puget Sound Properties Must Pay 1919 Taxes—City Considers Ways and Means

Word has been received from Washington, D. C., that the appeal of the Puget Sound Power & Light Company from the imposition of 1919 taxes on the Seattle (Wash.) Municipal Railway property has been dismissed by the United States Supreme Court. The suit was brought by the power company, as plaintiff in error, against King County. King County obtained a rule in the Washington state courts that it had a right to collect $401,000 accrued taxes, now amounting, with interest, to $640,000 on the railway property for 1919, as the assessment was made before the railway became exempt from taxation by transfer of ownership to the city. The appeal followed, but no briefs were submitted, and hearing had not been held. The case was dismissed because attorneys failed to deposit with the clerk of the court an amount sufficient to cover the cost of printing the record.

Under an agreement, if the tax must be paid, the city of Seattle, which owned the railways for three-fourths of the year, must pay three-fourths of the tax, or about $480,000, while the power company must pay one-fourth.

With approximately $480,000 in unpaid 1919 taxes which the Seattle Municipal Railway must pay, and with the 5-cent fare effective March 3, city officials are anxiously considering ways and means of raising the money required to meet the railway deficit. Councilman E. F. Blaine, chairman of the finance committee, has urged Superintendent of Public Utilities George F. Russell to make a constructive suggestion as to any methods that would be helpful. The Municipal Railway has completed plans for increasing service under the 5-cent fare and taking care of the expected increased patronage.

Superintendent of Railway D. W. Henderson states that it is realized by officials that the success of the 5-cent fare, which has been restored, as noted elsewhere in this issue, depends upon the increase in railway traffic and every effort will be made to stimulate traffic.

Company Continues Fifty-four-Cent Wage Scale

The Boston & Worcester Street Railway, Framingham, Mass., has decided to continue the 54-cent wage rate during the balance of the contract with its men. The contract with the blue uniform men entered into on Sept. 1, 1922, was on a basis of 54 cents an hour until March 1, 1923, and 53 cents an hour from March 1, 1923, to Sept. 30, 1923.



Exterior View of New Northern Elevated Railroad Station

Chicago "L" Opens New Station

To take care of the enormous growth of the uptown section of Chicago, which until the last year or two had been known as the Wilson Avenue district, the Northwestern Elevated Railroad has built an entirely new station at Lawrence Avenue, which was opened up on Feb. 27, at 8 p.m. Officials of the road, a forty-piece Elevated band and members of the Uptown Chicago Business Men's Association were present at the opening. Speeches were made by officials of the railroad and by officers of the business men's association.

The Wilson Avenue station was for many years the northern terminus of the elevated line. There was a very rapid growth about this point which centered along Wilson Avenue. More recently, however, this growth has expanded to the north, so that Lawrence Avenue, two blocks farther north and the mile-section street, on which a surface car crosstown line operates, has become a nearly equally important center. The traffic carried by the elevated to and from this district is so heavy that it has warranted the opening of this additional station, giving two stations only two blocks apart.

The station is of the new island platform type, similar to the design already in service along the newly elevated portion of the Evanston line. The street level of the station is beautifully constructed of marble and tile and includes, in addition to the space occupied by the company, a store on either side of the entrance. Due to the fact that this station was not contemplated until after the abutment wall and fill had been made for the track elevation, it was necessary to move the abutments, consisting of 250 yd. of concrete, back from the street line 65 ft. and remove that portion of the fill. The steel structure over the street was separated and moved bodily each way to make room for the island platform. The cost of the station, including the extraordinary construction work, was about $90,000, of which $30,000 was spent on the building proper. The station was designed by the company and the construction contracted for.

Court Rules Commission Must Act on One-Man Car Issue

A preliminary injunction prohibiting the city of Clarksburg from putting into effect its recently-adopted ordinance restraining the Monongahela Power & Railway Company from operating one-man cars in the city was granted by Judge Haymond Maxwell at a special term of the Harrison County circuit court. Judge Maxwell's opinion granting the car company the preliminary injunction is quite a lengthy affair and one of the principal reasons set forth for granting the request is that the Public Service Commission is delegated authority to act in such matters. The Judge also assumes that if the necessary time is allowed the traction company will take the case before the commission. Immediately after granting the temporary injunction, counsel for the city, Fred L. Shinn and E. G. Smith, gave notice of action on the part of the city to have it dissolved.

In part Judge Maxwell's opinion follows:

> Upon reason it would seem that where a public service corporation has adopted a policy that may or may not be just and reasonable, the Public Service Commission is the governmental instrumentality best calculated and best equipped thoroughly to investigate the matter and then to prescribe such practices as may be just.
>
> The railway alleges in its bill that the one-man car question is a proper one for determination by the Public Service Commission. Presumably, therefore, the company will promptly take this question to the Commission if the operation of the ordinance is enjoined for a sufficient length of time to permit the matter to be presented to, and considered by, the commission. Acting upon this assumption, and being of opinion under the principles hereinabove discussed, that this matter ought to go to the Public Service Commission, and that the present status should be preserved at least for a reasonable time to afford opportunity for action by the commission, the court awards a preliminary injunction prohibiting the enforcement of the one-man car ordinance until further order of the court.



Interior View of Station

Trainmen and Police Officers Will Co-operate

To effect close co-operation between police traffic officers and trainmen, three meetings of trainmen of the Los Angeles (Calif.) Railway were held Feb. 20. Capt. James McDowell, head of the police traffic department, spoke of some of the traffic conditions peculiar to Los Angeles in which trainmen can help. After each meeting he answered questions presented by trainmen. As a result of the gatherings, arrangements have been made whereby the police department and street railway officials will prepare a small card form to be carried by trainmen. On this card they will note the license number and other necessary information where automobiles pass standing street cars or violate other city ordinances. This information has been supplied to the company's safety bureau in reports of trainmen, but, as Captain McDowell said, he is anxious to have the reports made regularly and systematically.

Dip Subway Plans Being Prepared

Engineers for the Street Railway Department of the city of Detroit, Mich., are preparing plans for a downtown subway dip system with an underground loading station at a central point. The project is to be submitted to the voters at the October primary election. An agreement has been reached with the Rapid Transit Commission and the plans will be reviewed by the engineers of that body in order to insure co-ordination with the general subway plan.

The members of the Rapid Transit Commission are of the opinion that a system that would best relieve surface

congestion at this time may not be the best system as the population of the city increases. The present agreement between the two commissions, it is pointed out by Sydney D. Waldon, chairman of the Rapid Transit Commission, will afford relief from the downtown congestion in a comparatively short time and will permit the Rapid Transit Commission to confine its efforts to its primary purpose of carefully developing plans for the transporation needs of a city of 3,000,000 people.

Clarence E. Wilcox, Corporation Counsel, is now working on legislation planned to raising Detroit's bonding limit from the present 2 per cent of the city's assessed valuation to 4 per cent, for public utility purposes, such action being permissible under the Home Rule act. The city officials are hopeful that permission to increase the bonding limit will be granted at the present session of the State Legislature as a bond issue for the proposed subways would more than exhaust the balance of the city's present bonding limit.

It's the Car Rider that Pays for Paving

The United Traction Company, Albany, N. Y., has posted in its cars a placard showing the alleged injustice of existing laws which make it mandatory that traction companies pay for the improvement and upkeep of pavement of city streets between the rails and for 2 ft. each side of them. The bulletin reads:

THE PAVING TAX

A Relic of Horse Car Days

Back in the horse car days when street cars really wore out pavements, street car companies were required to pay for all paving inside their tracks and two feet outside.

This means from one-third to two-thirds of the entire street area.

The horse cars have been gone thirty years. The paving tax still stands.

You—the car rider—pay for it.

New System to Be Constructed

The Council of Orange, Tex., has granted a franchise on application of Harry A. Burr, general manager of the Orange Light & Water Company, and his associates, for the right to operate electric passenger carrying vehicles in the city for a period of forty years. The company is proposing to try out a system of trackless cars to be operated only on paved streets. The streets on which the cars are to be operated, fares to be charged, etc., are to be decided by the City Council and directors of the company in joint conference.

Saginaw Votes Down Bus Franchise

Citizens of Saginaw, Mich., expressed their disapproval on March 7 of the Henning-Wade franchise which offered city-wide motor bus operation with the installation of forty motor omnibuses. The vote stood 8,540 for and 6,023 against. The measure failed by 2,517 to obtain even a majority and lacked 2,714 of the necessary 60 per cent.

This was the first opportunity that the people of Saginaw had to express their choice on a definite motor bus proposal since suspension of service in August, 1921, by the Saginaw-Bay City Railway. The grantees were Leonard A. Henning, Saginaw, and John Wade, Atlantic City, N. J. There will be another vote in Saginaw on April 2 on a car-bus franchise.

Will Demand a Ten-Cent an Hour Increase

Employees of the New York State Railways in Rochester, Syracuse, Utica and Rome are organizing to demand a wage increase of from 50 to 60 cents an hour. The men accepted a wage reduction from 53 to 50 cents a year ago and now contend that the cost of living has since risen. The men contend that the operators of one-man cars should receive at least 25 per cent more than men on two-man cars. The wage agreement does not expire until June 1.

News Notes

Idea of Elective Commission Rejected.—Popular election of members of the Public Utilities Commission was rejected in the Connecticut Senate on March 2. Minority Leader McGrath's bill provided that the members be selected in this manner rather than by appointment of the Governor.

New Pamphlet Appears.—In addition to the Public Service News published by the Winnipeg (Man.) Electric Railway and devoted to activities in the railway field the company has started a monthly pamphlet entitled The Utility Optimist, in the interests of its power and light customers. The first issue is dated February, 1923.

Increases Force. — The Springfield (Mass.) Street Railway has added sixty blue uniform men to its regular force by calling back forty men that had been laid off and employing twenty new men. This addition was made in conformance to a rerouting of cars and change of schedule so as to afford more time for the round trip in rush hours and admit of more frequent service in several instances.

Seeks Repeal of Trolley Act.—The first move has been made for repeal of the Brooks-Coleman act in Minnesota. This measure put jurisdiction over the rates of electric railways in the hands of the State Railroad & Warehouse Commission. It was introduced in the House by a League member. One section proposes annulment of indeterminate permits granted the Twin City lines under the terms of the 1921 law.

Will Guard Carhouses.—The Louisville (Ky.) Railway is planning to use guards at its carhouses, temporarily at least, as a result of the two recent carhouse fires, one of which occurred on Feb. 16 and the other on Jan. 16, resulting in heavy losses. While the company has no reason to believe that the fires were of incendiary origin, it is felt that the guards at least would be useful in putting out a fire before it obtained headway. Nine men will be used for the time being.

Hardship Experienced.—A traction car on the Evansville and Ohio Valley Traction Company line leaving Henderson, Ky., was marooned on a ferry boat on the Ohio River recently for more than twelve hours. The car had about twenty-five passengers aboard. A violent storm with a fifty-mile wind made it necessary to tie the ferry to the willows on the Kentucky side. Most of the passengers were women and children. Food and fuel were taken to the passengers in skiffs.

New Railway in Prospect. — H. S. Shaner, Sand Springs, Okla., is the promoter of a new electric railway in south Missouri to be about 300 miles long. The line will connect with the Frisco line at Cabool, Texas County, and at Winona, Shannon County. Connection with the Springfield & St. Louis line will be made at Salem, Dent County. Other steam lines will be joined at Patosi in Washington County and Bismark, in St. Francis County. The charter name for the new line is the Missouri Hydro-Electric Interurban. The dam and power plant are to be located on Current River, in Round Springs.

Will Accept Company's Offer.—Linemen and electrical helpers employed by the Cincinnati (Ohio) Traction Company, who went on a strike last November because the company refused to grant them a 25 per cent wage increase, recently voted to accept the offer of their employers. Theodore H. Schoepf, chief engineer of the traction company, said that on Nov. 15 last fifty men, members of Local 101 of the Electrical Workers' Union, declared a strike, although they had an arbitration clause in their contract. Despite the fact the men called off the strike, Mr. Schoepf said he would take back as individuals such men as he needed and that they would be paid the same scale of wages that prevailed prior to the strike. Durthe strike the traction company recruited men from other cities.

Plans Made for Final Dual Transit Construction.—Plans for the construction of one of the two remaining section of the Nassau Street subway in Manhattan Borough—the final piece of construction work provided for under the dual contract—have been completed, according to an announcement made by the New York Transit Commission. A hearing will be held on the formal contracts for the whole route on March 26. The Nassau Street line will be part of the system operated by the Brooklyn Rapid Transit Company. It will extend from the Municipal Building, at Chambers Street, where connection will be made with the Center Street loop tracks under that structure south through Printing House Square and Nassau Street, to Wall Street, thence the line will continue on through Broad Street to a connection with the Montague Street-Whitehall Street Brooklyn Rapid Transit tunnel.

Financial and Corporate

I. T. S. Merger Details

New Company to Be Organized to Take Over McKinley and Studebaker Properties

Confirmation has been obtained of the rumor that Senator William B. McKinley and others associated with him in the development of the Illinois Traction System are proposing a consolidation of the Southern Illinois properties controlled by Clement Studebaker and his associates with the properties of the Illinois Traction Company. On the other hand, the interests associated with Mr. Studebaker plan to acquire a substantial interest in the Illinois Traction Company. These interests have also associated with themselves strong financial backing for the purpose of financing the present and future requirements of the unified and consolidated properties.

In order to provide the simplified financial structure fundamental to the whole problem of future capital requirements, it is proposed to consolidate all of the operating properties of the Illinois Traction Company in Illinois into one company, to be known as the Illinois Power & Light Corporation, and to acquire through consolidation the properties operated by the Southern Illinois Light & Power Company. To accomplish this consolidation and to establish a proper foundation for a new first and refunding mortgage for the new consolidated operating company, including the creation of an attractive preferred stock, it is planned to acquire approximately $22,000,000, par value, of bonds and to call for redemption a further $9,000,000 of bonds now in the hands of the public.

It is also proposed to acquire about $9,300,000 of guaranteed preferred stock issued by subsidiary companies and $1,641,000 of preferred stock of the Illinois Traction Company. All these holdings will either be canceled or pledged under the new mortgage. In addition it will be necessary to provide for the retirement of $5,649,000 of Illinois Traction preferred stock, $2,169,000 of Western Railways & Light preferred, $1,665,000 of Southern Illinois Light & Power preferred and $631,000 of Bloomington & Normal Railway & Light preferred, all of which are now in the hands of the public. In this connection, the intention is to offer the holders of these securities in exchange therefor a like amount of 7 per cent cumulative preferred stock of the new Illinois Power & Light Corporation.

As existing legal requirements make it either impossible or undesirable to acquire direct ownership of all the properties comprising the Illinois Traction System, it will probably be necessary for the Illinois Power & Light Corporation to control through stock ownership the Illinois interurbans and the utilities operating in states other than Illinois.

Succinctly stated, the plan provides for the ultimate retirement or exchange of approximately $50,000,000 of securities and the creation of a new company, all of whose common stock will be owned by the Illinois Traction Company, which company will create a new first and refunding mortgage and an attractive preferred stock, which will make it possible to finance future requirements through the existence of securities guarded by conservative restriction. After having effected the reorganization and financing, the capitalization, subject to approval of the Illinois Commerce Commission, will be approximately as follows:

Divisional bonds (including Southern Illinois Light & Power bonds)	$36,414,800
First and refunding mortgage 6 per cent bonds	30,000,000
Thirty-year 7 per cent sinking fund debentures	10,000,000
First preferred 7 per cent cumulative stock, par $100	17,678,500
Participating preferred stock 6 per cent cumulative, par $50	1,865,500
Common stock, no par value	400,000 shares

All of the common stock of the new consolidated company will be owned by the Illinois Traction Company, the common stock of which will not be disturbed. It is expected that an offer of exchange will be made to the holders of the outstanding common stock of the Illinois Traction Company to exchange their holdings for securities upon which it is proposed to inaugurate dividends at once, the acceptance of such offer being optional to the stockholder.

The fact that a deal was pending such as is now outlined was referred to briefly in the ELECTRIC RAILWAY JOURNAL for March 2, page 384.

Reorganization of United Railways Investment Proposed

Reorganization of the United Railways Investment Company, by the division of its eastern and western subsidiaries into separate companies, is now being planned.

In the Eastern company would be combined the Philadelphia Company, Duquesne Light & Power and Pittsburgh Railways. It has been proposed that the new company purchase from the United Railways Investment Company $24,475,000 common stock of the Philadelphia Company, making payment in its common and preferred stock. To carry out this plan, a new issue of $10,000,000 bonds at 6 or 7 per cent and a new issue of preferred stock will be offered.

In the Western company would be grouped the United Railroads of San Francisco, Sierra & San Francisco Power and Coast Valley Gas & Electric Company.

North American Does Well

Net Addition to Surplus Was $1,766,672 After Making Very Liberal Appropriations

The consolidated income statement of the North American Company, New York, N. Y., and its subsidiaries shows a balance for depreciation, dividends and surplus of $11,303,731 for the year ended Dec. 31, 1922, compared with $6,711,141 for the previous year. In his remarks to the stockholders Frank L. Dame, president of the company, says that during the year several important public utility properties were added to those heretofore controlled, the most important being the Cleveland Illuminating Company. Mr. Dame explains that the earnings of these properties are not included prior to the date of their acquisition and the statement of the present earning power of the company is therefore on a conservative basis. During the year substantial progress was made in the development of the financial structures of subsidiaries in order that senior securities may be marketed under even the most adverse conditions.

Mr. Dame refers back to the report of the company for 1905 to reiterate the statement that the company holds the securities of other companies as permanent investments and seeks to establish them in the favor and confidence of the public by just methods and efficient administration and to maintain their finances on the most conservative basis. Notwithstanding large capital demands during the year, a materially larger distribution of earnings has been made to stockholders. Mr. Dame then recommends the increase in the authorized common and preferred stocks and the change in the par value of the common stock from $50 a share to $10 a share, referred to previously in the ELECTRIC RAILWAY JOURNAL.

CONSOLIDATED INCOME STATEMENT OF THE NORTH AMERICAN COMPANY AND SUBSIDIARY COMPANIES

	Year Ended Dec. 31, 1922	Year Ended Dec. 31, 1921
Gross earnings	$55,234,491	$38,853,189
Operating expenses and taxes	35,812,043	26,791,255
Net income from operation	$19,422,448	$12,061,934
Other net income	407,182	307,196
Total	$19,829,631	$12,369,130
Deductions:		
Interest charges	$6,667,283	$4,603,114
Preferred dividends of subsidiaries	1,318,172	684,565
Minority interest in subsidiaries	540,444	370,309
Total deductions	$8,525,899	$5,657,988
Balance for depreciation, dividends and surplus	$11,303,732	$6,711,142

In his report to Mr. Dame, Edwin Gruhl, vice-president and general manager of the company, calls attention to the fact that the gross earnings of the subsidiary companies for 1922 amounted to $55,234,491, an increase of $16,381,301, or 42.16 per cent. Of the total gross earnings 65.33 per cent was

STATEMENT OF CONSOLIDATED SURPLUS OF THE NORTH AMERICAN COMPANY AND SUBSIDIARY COMPANIES, DEC. 31, 1922

Surplus, Jan. 1, 1922			$12,776,355
Additions:			
Balance for depreciation, dividends and surplus year ended Dec. 31, 1922		$11,303,731	
Other credits to surplus		953,268	
Total additions			$12,256,999
			$25,033,356
Deductions:			
Appropriations for depreciation reserves		$5,209,882	
Dividends on stock of the North American Company:			
Preferred stock	$1,061,998		
Common stock	1,857,088		
		2,919,089	
Write down in book value of securities		1,601,219	
Unamortized discount and/or premium on securities redeemed or exchanged		661,439	
Miscellaneous charges		98,698	
Total deductions			$10,490,327
Surplus, Dec. 31, 1922			$14,543,029

derived from electric and heating, 18.63 per cent from railway, 4.04 per cent from gas, and 12 per cent from coal operations. Operating expenses and taxes amounted to $35,812,043, an increase of $9,020,787, or 33.67 per cent. Net income from operation amounted to $19,422,447, an increase of $7,360,513, or 61.02 per cent. Of net income from operation 76.58 per cent was derived from electric and heating, 12.46 per cent from railway, 3.13 per cent from gas, and 7.83 per cent from coal operations. The balance for depreciation, dividends and surplus amounted to $11,303,731, compared with $6,711,141 for 1921, an increase of $4,592,589, or 68.43 per cent. The corresponding balances for the three previous years were: 1920, $5,396,288; 1919, $4,580,701, and 1918, $2,549,864. The companies referred to as subsidiaries and included in the foregoing statements are only those companies of whose common stock more than three-quarters is owned by the North American company or its subsidiaries. Accordingly, gross earnings do not include revenues from very substantial interests in other utilities or industrials.

Mr. Gruhl says that the company has derived substantial revenues from investments, syndicate participations and underwritings. He explains that the greater part of these earnings has been applied to writing down book values of securities.

Total additions to surplus for the year 1922 from earnings and other sources amounted to $12,256,999. Of this amount $5,209,882 was appropriated for depreciation reserves, $2,919,087 was paid as dividends on preferred and common stock of the North American Company, $1,601,219 was applied to the writing down of book values of securities, and $760,138 was charged off on account of unamortized discount, etc. The net addition to surplus for the year was $1,766,672.

Four quarterly dividends, each of 1½ per cent, were paid during the year on the preferred stock. The dividends on the common stock were increased to 2½ per cent quarterly beginning with the April 1, 1922, dividend, of which 1 per cent was paid in preferred stock at par and 1½ per cent in cash. The July 1 and Oct. 1, 1922, quarterly dividends on the common stock, each of 2½ per cent, were paid entirely in cash.

In conclusion Mr. Gruhl refers to the fact that upward of $25,000,000 of the securities of subsidiaries of the company are held by more than 33,000 residents of the territory they serve.

Railway Not Included in Deal for Light Plant

The property of the Piedmont Power & Light Company, Burlington, N. C., had been sold to Philadelphia and New York public service operators, according to the announcement. The power and light plant at Burlington has been in operation for thirteen years, being operated in connection with the Alamance Railway, a street railway connecting Burlington, Graham and Haw River.

The Piedmont Power & Light Company has been owned and controlled in the past by J. R. Paschall, Warner Moore of Richmond, Va., Junius H. Harden, John M. Cook and the State Realty Company of Burlington.

W. R. Dixon, formerly connected with the Kentucky & West Virginia Power Company, has been chosen manager of the concern under the new ownership. He comes from Logan, W. Va.

It is understood that the purchase price of the power and light plant was about $1,000,000. It is further understood that the sale of the power and light plant does not affect the Alamance Railway, an 8-mile line, which has been operated jointly with the power and light plant, and that the railway will be continued as usual.

Dubuque Property Bought

All the common stock of the Dubuque (Ia.) Electric Company has been purchased by Albert Emanuel Company, Inc., New York, N. Y. The new company has had much practical experience in directing various public utility enterprises. The Dubuque Electric Company operates the electric light and power and railway systems in Dubuque.

The new purchasers also acquired the majority of the outstanding stock of the Eastern Iowa Electric Company, which supplies light and power to a number of settlements near Dubuque. Albert Emanuel has been elected president of the Dubuque Electric Company to succeed I. C. Elston, Jr. O. H. Simonds, who is general manager, has in addition been elected vice-president and a director of the company.

Good Year in Columbus

Dividends Resumed by This Company and Securities Strengthened by Upbuilding of Property

The Columbus Railway, Power & Light Company, Columbus, Ohio, reports a profit and loss surplus for the year ended Dec. 31, 1922, of $1,467,196. This figure compares with $1,954,908 for 1921, but the 1922 figure takes into account dividend payments deferred from previous year. The comparative statement is as follows:

	1922	1921
Railway revenue	$3,611,590	$3,581,555
Power, light and heat revenue	3,880,440	3,386,611
Non-operating revenue	7,312	8,875
Total gross revenue	$7,499,343	$6,977,041
Operating expenses and taxes	4,497,289	4,366,757
Interest on funded debt	818,554	738,719
Interest on unfunded debt	12,342	4,375
Other deductions	77,627	130,162
Net income	$2,093,530	$1,737,029
Previous surplus	1,954,908	893,626
Other credits	234,210	56,138
Total surplus	$4,282,648	$2,686,792
Depreciation	972,000	528,000
Sinking fund	245,846	.....
Preferred dividends (in stock)	(a) 1,227,996	.....
Preferred dividends (in cash)	(b) 279,242	.....
Other debits	90,368	203,884
Profit and loss surplus	$1,467,196	$1,954,908

(a) Includes $392,376 paid in 6 per cent Series "A" preferred stock and $835,620 in 5 per cent Series "B" preferred stock on account of accumulations. (b) Includes $91,227 paid in cash on the 6 per cent Series "A" preferred stock and $188,015 on the 5 per cent Series "B" preferred stock.

Charles L. Kurtz, president of the company, says that the securities of the company have been strengthened by the upbuilding of its properties. During the past year additions and betterments representing a total expenditure of $1,930,946 were made. A large proportion of this total expenditure, namely $780,556, represented additions and betterments for track and roadway made in compliance with the obligations of the company to the city. In order to provide efficiently for the increase in kilowatt-hours sold, number of customers and connected load, it was necessary materially to increase the capacity of the transmission and distribution lines as well as the capacity of transformer and substation equipment. The items of cost, representing the additions and betterments for these purposes, approximated $1,095,001. Other additions and betterments to the properties amounted to $55,388 and represented expenditures for car equipment, office fixtures, etc.

The fares in Columbus have always been very low, and the company continues to operate its cars at a rate of fare which is much below that of other cities in Ohio, and greatly below the average of other cities in the country. The revenue passengers carried for 1922 showed a slight decrese over the number of revenue passengers carried during 1921. The transfer passengers showed a small increase over similar figures for 1921. The total passengers showed a very slight increase over the same period of 1921. The car mileage

for 1922 totaled 9,021,094, showing an increase of 504,794 car-miles, or 6 per cent.

In presenting his report for the year President Kurtz referred to the so-called Slaymaker case. He said that in what is known as the Slaymaker case, the Court of Common Pleas of Franklin County, Ohio, on March 17, 1922, rendered a judgment against the E. W. Clark Company, Philadelphia, and the individual members thereof, in the sum of $1,512,570 with interest from Feb. 15, 1922. On March 31, 1922, he explains that the Clarks entered into a declaration and settlement of such an agreement, whereby securities of the value equal to the judgment were deposited with the Guarantee Title & Trust Company, Columbus, Ohio, which company signed the appeal bond as surety for the Clark defendents. On Oct. 10 and 11, 1922, upon the application of the Clarks the Court of Appeals heard further evidence in the case. On Nov. 9 and 10, 1922, the case was orally argued through the Court of Appeals. Printed briefs were also submitted to the Court of Appeals and the matter is now pending in that court for a decision. The progress of this proceeding before the courts has been reviewed previously in the ELECTRIC RAILWAY JOURNAL.

$319,724 Balance for Interborough in January, 1923

The Interborough Rapid Transit Company, New York, N. Y., showed a balance of $319,724 over expenses and fixed charges during January, according to a statement issued on Feb. 25 by Frank Hedley, the president. This was the first complete month under the new board of directors, chosen after the consummation of the plan of financial readjustment recently carried out. The net earnings of the Interborough for the month are shown by the following table:

Total revenues		$4,983,957
Operating expenses, taxes and rentals paid city for the old subway		3,450,116
Income available for all purposes		$1,533,641
Fixed charges:		
Interest on I. R. T. first mortgage 5 per cent bonds	$669,484	
Interest on Manhattan Railway bonds	150,685	
Interest on I. R. T. 7 per cent secured notes	183,866	1,004,038
		$529,803
Interest on I. R. T. 6 per cent ten-year notes	$8,143	
Miscellaneous income deductions	51,935	60,078
Earnings without deducting sinking fund on the I. R. T. Co. first mortgage 5 per cent bonds ($179,499 for January, 1923) which does not become operative until July 1, 1926, but which must be deducted from earnings before arriving at the sum available for dividends on Manhattan stock		$649,724
Dividend on $60,000,000 Manhattan stock at 3 per cent annual rate		150,000
Balance		$319,724

Referring to the reduction in the company's fixed charges under the plan of readjustment, Mr. Hedley continued:

With these reduced charges, despite the increase in the cost of doing business growing out of efforts to render better service to the public, in this month of January the company earned all of its operating expenses, payments to the city for rentals under Contracts 1 and 2, taxes, and one-twelfth proportion of its annual obligations under the plan of readjustment, with a margin as indicated in the statement of earnings and expenses.

As has been explained previously in the ELECTRIC RAILWAY JOURNAL, fixed charges do not include sinking fund on Interborough first mortgage 5 per cent bonds payment which, under the plan of readjustment declared operative July 1, last, is postponed until July 1, 1926. Postponement of sinking fund payments aggregating approximately $175,000 a month was assented to by holders of I. R. T. 5s in order to improve the company's cash position and temporarily to increase the amount of earnings available for betterments, additions and improvements.

13.07 per Cent Earned on Standard Gas & Electric Common

The preliminary statement of the Standard Gas & Electric Company, Chicago, Ill., for the year ended Dec. 31, last, showed a surplus after preferred dividends and reserves, available for the common stock, of $1,386,457 which is equivalent to 13.07 per cent on the outstanding common stock, as compared with $1,080,980, equivalent to 10.19 per cent on the common stock in 1921.

The revenues and expenses of the company for the twelve months compared with those of 1921 are as follows:

	1922	1921
Gross income	$4,759,702	$3,632,745
Expenses and taxes	107,586	68,624
Net income	$4,652,126	$3,564,121
Interest charges	1,840,704	1,367,753
Balance	$2,811,422	$2,196,368
Preferred dividends	1,074,965	990,388
Balance	$1,736,457	$1,205,980
Amort. and other reserves	350,000	125,000
Surplus	$1,386,457	$1,080,980

Seven Months Net Increase

Although the total operating revenues of the Brooklyn (N. Y.) Rapid Transit Company for the month of January, 1923, were $247,880 above those of January, 1922, the total operating expenses for the month in 1923 were $287,269 above those of a year ago, resulting in a decrease of $39,389 in net revenue from operation in January, 1923, as compared with January, 1922. The increase in operating expenses is due to the fact that included in the January, 1923, statement are charges aggregating approximately $150,000 for paving, track reconstruction and damage expenses on surface lines accrued as far back as 1920. In addition to these items, the cost of operation of the power plant increased from $268,820, in January, 1922, to $343,888, in January, 1923, largely due to the increased cost of coal this year.

For the seven months ended Jan. 31, 1923, the net income realized was $1,567,591, compared with $1,498,016 for the seven months period ending Jan. 31, 1922.

Broad Survey Planned

Engineer Names Nine Points Essential for Answer in Los Angeles Valuation

In connection with the proposed valuations of the railway properties in Los Angeles, Calif., to which reference was made in the ELECTRIC RAILWAY JOURNAL for March 3, it is considered that to a great extent the value of the properties of the Pacific Electric Railway has been completed, as data are available. These data were collected for the Hollywood rate case, conducted during the past eighteen months. This valuation covered both interurban and local lines operated by the company in four different counties in southern California. The Pacific Electric, as a matter of fact, operates local lines in seven other cities outside of Los Angeles.

As Richard Sachse, who will make the valuation, sees it, however, the valuation will have to be modified so as

1. To cover only such property of the company as is allocated solely to the company's local system in the city of Los Angeles.
2. To conform to such considerations of valution as should be applied when the question of sale and transfer of the property is at issue.

In the case of the Los Angeles Railway Corporation's lines locally serving the city of Los Angeles, Mr. Sachse states the task will be somewhat more extensive. This is due to the fact that the railway's property has not been valued since 1912. Since then the property has been greatly enlarged. Consequently, it will require a complete analysis of the property's financial status and its present earning power.

Briefly, Mr. Sachse believes that in order to draw sound conclusions it will be necessary:

1. To make a complete valuation of the Los Angeles Railway's properties to determine purposes of transfer for sale.
2. To make an evaluation for purposes of transfer or sale of such sections of the Pacific Electric Railway properties necessary for unifying of the lines in the city of Los Angeles.
3. To determine the purchase price the Los Angeles Railway shall pay to the Pacific Electric Railway, provided it is recommended that the former company take over the local system of the latter company in Los Angeles.
4. To determine the purchase price that the Pacific Electric Railway should and could pay to the Los Angeles Railway, provided it is recommended that the former company take over the entire local system of the latter company in the city of Los Angeles.
5. To calculate the results from the standpoint of service, fares, operating savings, revenues and expenses, provided the Pacific Electric Lines purchased the local lines of the Los Angeles Railway in Los Angeles.
6. To calculate the results from the same standpoint, provided the Los Angeles Railway purchased the local lines in the city of Los Angeles as owned and now operated by the Pacific Electric Railway.
7. To estimate the cost to the city of Los Angeles to operate the local lines of each of the respective companies separately or both lines, should the city elect to purchase either one or both of the properties in question.
8. To determine what the outcome or results would be from the same standpoint as outlined in paragraphs 5 and 6, provided the city of Los Angeles acquired and operated either one or both of the lines.
9. To determine a solution of the question of how necessary extensions can be taken care of under various possibilities, with respect to how it concerns railway extensions and bus line extensions.

New York State Railways Has Good Year

The New York State Railways, Rochester, N. Y., made an excellent showing in the year ended Dec. 31, 1922, compared with 1921. Although railway operating revenue for the year decreased more than $190,000 railway operating expenses including depreciation decreased $824,359. Thus net revenue from railway operation increased $632,317. The surplus of $244,228 for the year was $97,426 less than in 1921, but in 1922 common stock dividends of $299,175 were paid whereas there was no payment of this kind in 1921.

In his remarks to stockholders James F. Hamilton, president of the company, explains that the company has further paid up all the arrears on the preferred stock which, at the beginning of the year, amounted to 18¾ per cent, paid the current dividend of 5 per cent, and 1½ per cent on the common stock. He says an agreement was entered into with the employees covering wages and working conditions for one year from June 1, 1922, which involved a slight reduction in wages.

With respect to the application of the company for an increased fare in the city of Utica, denied by the Public Service Commission, Mr. Hamilton explains that this was reviewed and referred back to the commission by the courts for reconsideration, with the result that the fare was increased from 6 cents to 7 cents. At the same time the Public Service Commission adjusted the fares in the city of Syracuse from 8 cents cash and a 7½-cent ticket rate to a flat 7-cent fare, thus making a 7-cent cash fare the prevailing rate in all the cities in which the company operates.

In April, 1922, the company sold $3,000,000 of its first consolidated mortgage 4½ per cent bonds bearing 2 per cent per annum additional interest not secured by the mortgage. The proceeds from the sale of these bonds permitted the company to refund two matured issues of underlying bonds aggregating $925,000, liquidate all its bank loans and accounts payable and partly to reimburse its treasury for capital expenditures made from income.

SUMMARY OF OPERATIONS OF THE NEW YORK STATE RAILWAYS

	1922	1921
Operating revenues	$10,500,220	$10,692,262
Operating expenses (including depreciation)	7,687,017	8,511,376
Net revenue	$2,813,203	$2,180,886
Auxiliary operations	1,544	1,261
Net operating revenue	$2,814,747	$2,182,147
Taxes assignable to railway operations	705,382	627,903
Operating income	$2,109,365	$1,554,244
Non-operating income	97,421	388,653
Gross income	$2,206,786	$1,942,897
Deductions from gross income	1,435,517	1,374,044
Net income	$771,269	$568,853
Sinking fund appropriations	34,740	34,073
Dividends preferred stock (5%)	193,125	†193,125
	$543,403	$341,654
Dividends common stock (1½%)	299,175	.....
Surplus	$244,228	$341,654

† Paid in year 1922.

January Net Income Amounts to $70,558

For the month of January, 1923, the city of Detroit, Department of Street Railways, reported a total operating revenue of $1,712,228, against $1,650,927 for December, 1922. Included in total revenue is revenue from transportation, amounting to $1,620,210 in January, an advance of $59,547 over the transportation revenue for December. Operating expenses were $1,213,884 for December, compared with $1,221,492 in January of this year. The net revenue from railway operations was $490,736 in January and $437,043 in December. After necessary deductions the net income realized in January is reported as $70,558, against $47,271 in December, 1922. In December 38,258,194 passengers were transported and in January 40,167,868.

Toronto Award May Be Appealed

Reports from Toronto indicate that the award of $11,188,500 as the price to be paid by the city for the properties of the Toronto (Ont.) Railway may be appealed from by the city to the Privy Council in London. The president, Sir William Mackenzie, in a letter to stockholders states that if the award stands and no other contingencies arise the stock should be worth par or better. Expenses in connection with the arbitration proceedings have cut heavily into the balance of $1,000,000 expected from other properties over and above the award. The equivalent of about $33 a share for each $100 par value of stock must remain with the trustees of the $4,103 200 bonds of the Toronto Power Company until July 1, 1924, when they mature.. The payment of these bonds has been guaranteed by the Hydro-Electric Commission, but under the sales agreement the deposit must remain with the trustee until the bonds are actually redeemed.

An abstract of the arbitration finding was published in the Electric Railway Journal for Feb. 10, page 247.

Auction Sales in New York.—At the public auction rooms in New York there were no sales of electric railway securities this week.

Surplus $334,625.—The net income of the Fort Dodge, Des Moines & Southern Railroad, Boone, Ia., for the calendar year ended Dec. 31, 1922, was $614,625 excluding depreciation. The balance or surplus was $334,625.

Traction Company Offers Collateral Bonds.—A syndicate headed by Tucker, Anthony & Company is offering at 92½ and interest to yield 7.06 per cent $2,305,00 Wilmington & Chester Traction Company's 6 per cent gold collateral trust bonds. In the public advertisement of the issue the purpose of the offering is not stated.

Net Income $99,682.—The Market Street Railway, San Francisco, Calif., for January, 1923, reports a railway operating revenue of $801 506 and operating expenses of $591,396. The net income amounted to $99,682.

Two New Directors for Bond & Share Company.—At the annual meeting of stockholders of the Electric Bond & Share Company, New York, N. Y., A. W. Burchard and C. E. Groesbeck were elected directors in place of Marsden J. Perry, resigned, and William C. Lane, deceased.

Large Advance in Tax Valuation in Ohio.—In the last twelve years there has been an advance of 446 per cent in tax valuations of public utility properties in Ohio. In 1910 the tax valuation on street, suburban and interurban railways amounted to $32,693,904 and in 1922 the figure was $198,362,040, an increase of 506 per cent.

January Net Income Lower.—The Eastern Massachusetts Street Railway, Boston, Mass., made a substantial gain in revenue in January as compared with the corresponding month a year ago, with a reduction in its fixed charges. The net income, however, was only $86,830 for January, 1923, as against $104,479 in January, 1922.

Net Income Increases.—The net income of the Philadelphia (Pa.) Rapid Transit Company for January, 1923, was $250,100, against $234,400 in January, 1922. The passenger revenue increased from $3,363,926 to $3,625,768 in January of this year. The number of passengers carried increased from 68,147,370 in January a year ago to 74,857,899 in January of the current year.

Bonds Offered. — Halsey, Stuart & Company, New York, N. Y., are offering $6,770,000 of first lien and refunding convertible 6 per cent gold bonds, series A, of the Monongahela West Penn Public Service Company. The bonds are dated Feb. 1, 1923, and are due Feb. 1, 1928. The price is $97.89 and interest to yield 6.50 per cent. The proceeds from this issue of bonds are to be used to retire $6,258,500 of 7 per cent bonds due July 1, 1923.

American Public Utilities Plan Approved.—The stockholders of the American Public Utilities Company, Grand Rapids, Mich., have approved the plan for the reclassification of the capital stock. As announced previously in the ELECTRIC RAILWAY JOURNAL the plan provides for the retirement of the present $4,268,200 of cumulative preferred stock and issuance of two other classes aggregating 110 per cent of the present preferred outstanding so as to fund the accumulated dividends and the scrip issued in lieu of dividends amounting to $1,406,758, which amount will constitute the only present increase in the capitalization of the company. Of the two classes to be issued under the plan, one will be a 7 per cent prior preference on which dividends will begin immediately and the other will be at the step rate of 4, 5, 6 and 7 per cent during the next four years.

Traffic and Transportation

Pass Successful in Terre Haute

More Revenue and More Rides with Fewer Car-Miles Offset Disadvantage of Coal Strike

Although the Terre Haute lines of the Terre Haute, Indianapolis & Eastern Traction Company sell the unlimited ride weekly pass at the highest multiplier known, namely, the cost of twenty fares, the company has been most successful in demonstrating that the high riding index obtained through short headway operation, safety cars and 5-cent fares can be stimulated still further. Figures compiled by E. M. Walker, general manager Terre Haute Division, show that for the first eight months of the pass—May 1 to Dec. 31, 1922, inclusive—the riding increased 7 per cent and the revenue 0.4 per cent. This occurred in spite of the fact that the great coal strike begun on April 1, 1922, made itself felt in Terre Haute business about the time that the pass was started and continued a depressing factor until September.

What is still more remarkable is that the revenue for all of 1922, including the five months before the pass, actually was 1.21 per cent below the year 1921 and the traffic correspondingly less, inasmuch as the fares in the pre-pass months of each year were the same. An accompanying table shows that for the first eight months of the pass there was an increase in revenue from $435,728 in 1921 to $437,349 in the same months of 1922. The number of customers rose from 10,479,417 to 11,295,320.

Another table shows that much better results are being obtained in the opening of 1923 as compared with the first seven weeks of 1922. The increase in revenue was from $88,136 to $94,559, or 6.8 per cent, while passenger traffic grew from 2,110,815 to 2,378,957, or 11 per cent. Expressed in another way, the number of rides per inhabitant per annum increased from 235.8 to 265.9. This means that more than thirty rides per inhabitant were added as compared with the passless period of 1922.

During the first eight months of the pass the mileage was slightly higher (2,053,211, against 2,016,711) than the same period of 1921, but the record for the first eight weeks of 1923 is lower than the first eight weeks of 1922, namely, 488,530 car-miles against 497,203 car-miles. Revenue increased 7 per cent, while car-miles dropped 1.7 per cent.

The net rides per pass, after allowances made for transfers, ranges between four and one-quarter and four and one-half a day. Therefore, the pass rider in Terre Haute actually gets a through ride for something like 3½ cents—the lowest electric railway fare in America.

The pass, of course, is bought almost entirely by residents with a definite riding need. For this reason, no passes are on sale on the cars after Wednesday of the week of use. Recently, however, a traveling man called at the city office on a Saturday morning and insisted that he be permitted to buy a pass. He said he felt sure he would get ample value for his money even though he had but Saturday and Sunday in which to make use of his purchase. This indicates that some people must purchase the pass purely as a matter of convenience.

TERRE HAUTE BEFORE AND AFTER WEEKLY PASS
Started May 1, 1922
First Seven Weeks — 1922 and 1923

	1922	1923	Per Cent Inc.
Revenue, city lines...	$88,136	$94,559	6.8
Pass rides.....	.....	332,356	...
Cash fares.....	1,760,668	1,689,439	...
Transfers.....	350,147	357,162	...
Total passengers...	2,110,815	2,378,957	11
Passes sold.....	None	10,030	...
Average per week....	None	1,433	...
Riding index per year	235.8	265.9	

EIGHT MONTHS, MAY 1 TO DEC. 31, 1921 AND 1922

	1921	1922	Per Cent
Revenue, city lines...	$435,728	$437,349	0.4
Pass rides.....	.....	1,659,840	...
Cash fares.....	8,647,799	7,808,595	...
Transfers.....	1,831,618	1,826,885	...
Total passengers..	10,479,417	11,295,320	7.2
Passes sold.....	None	46,920	...
Average per week....	None	1,340	...
Riding index per year	238.6	254.7	

Total revenue of 1922 was 1.21 per cent less than 1921.

Jitneys Will Replace Discontinued Railway Line

A jitney service has been organized to take the place of the Concord, Maynard & Hudson Street Railway, which went into the hands of receivers about a year ago and then was ordered discontinued by the court because the road could not be made to pay.

The Concord Board of Selectmen has adopted a set of jitney rules, and has granted a jitney license to John F. Lovell, Woburn, Mass., who already is running a line of buses between Woburn and Reading, where the Eastern Massachusetts Street Railway tore up its tracks several years ago for lack of sufficient income from the service to pay costs.

It has been arranged for Mr. Lovell to start his jitney service at once in Concord, with three buses, to run on regular schedules and cover the same routes that the Concord, Maynard & Hudson Street Railway covered, and a few side streets in addition. The fares for adults will be 10 cents between Concord and Concord Junction, and there will be 5-cent routes, and 5-cent fares for school pupils.

Inquiry Resolution Lost

Senator McKellar Fails in the Effort to Appoint Committee for District—Material Sought Now Available

The resolution of Senator McKellar of Tennessee to create a special Senate committee to investigate various questions affecting the rate of fare in the District of Columbia, which was regarded as a national affair, inasmuch as it would have created a precedent, failed of adoption in the closing hours of the Sixty-seventh Congress when objection to its consideration was entered by Senator McKinley of Illinois.

When objection was entered, Senator McKellar asked that the objection be withdrawn. He said:

> The street car compalnes have advertlsed here in the city of Washington in the newspapers that they courted an investigation, and I am sure they would not go back on their published statement. I hope the Senator will not object to the resolution.

Senator McKinley, however, renewed his objection. He said:

> The reading of the resolution at the desk causes me to object. If the Senator will take the trouble to write to the various public utility commissions he can get all the information the resolution calls for. The resolution provides for traveling all over the United States, bringing witnesses from all over the country to Washington, securing papers and general information which the Senator or any one interested can obtain from any of the public utility commissions in the United States.

As this occurred within a few hours of the end of the Congress, there was no further opportunity to renew the subject on the floor.

Data Sought All Available Now

The resolution was introduced by Senator McKellar as the climax of an effort he had been making for some weeks to bring about a restoration of 5-cent fares on the railways of Washington. The Senator from Tennessee, where the State Public Utilities Commission has been under fire in a recent political campaign in which Senator McKellar participated, has engaged in a newspaper controversy with members of the District of Columbia Public Utilities Commission following assertions by him on the floor of the Senate that the commission had exceeded its authority in granting an increase in fares to 8 cents cash and six tokens for 40 cents. Senator McKellar had charged that higher fares violated the franchise contracts and that they are unnecessary now, whatever may have been the case during the war. He had made several efforts to attach riders to various District of Columbia bills calling for a restoration of the 5-cent fare, with six tickets for 25 cents, before he introduced his resolution.

The resolution would have authorized a special committee to investigate the whole question of franchise rights of the electric railways in the District of Columbia, stock issues of the companies and their predecessors, the powers of the Public Utilities Commission, similar powers of other commissions and a wide range of related subjects, with directions that the committee report its conclusions regarding fares to the next Congress.

Controversy Settled—Railway Will Supply Service

In the controversy between the Boston (Mass.) Elevated Railway and the city government of Malden, previously reported in the ELECTRIC RAILWAY JOURNAL, Mayor Kimball of Malden yielded to the elevated and refused to sign an order from the City Council authorizing jitney competition with the railway.

As a result the competing jitney service will be withdrawn from Salem Street, where it has been operating, and the elevated will not only continue its car service there but will introduce bus service at various points as feeders. Mayor Kimball sent the following letter to the trustees of the railway in reply to the letter which the trustees had sent to him:

Believing the settlement of the jitney question to be a matter of vital importance to a large section of the city, I have taken time to consider it carefully.

While the section east of Malden Square is vitally affected this condition also affects the entire city because loss of elevated service here means a curtailment of service in other parts of the community, and, after all, no one can deny that we must, for the present at least, depend upon the Boston Elevated Railway for electric car transportation to and from Boston—this section in common with the rest of the city.

This service is necessary, whereas a competing jitney simply to and from Malden Square is not necessary.

With the present car service improved, as it will be, and an elevated jitney running to Linden, which will be put on as soon as cars can be obtained, I believe this part of the city will have adequate service.

Moreover, it must be remembered that under the present public management of the elevated, every taxpayer has a financial interest in it and should be concerned in its successful operation.

To remove this electric car service from the eastern section of the city would impose a severe hardship upon a large number of people, and, unfortunately, upon those least able to bear it; beyond this the loss in property value must be considered.

Therefore, with a full knowledge of all the facts and considering carefully the appeals of those most vitally affected, I cannot conscientiously see my way clear to sign a competing jitney license and shall not do so.

In reaching this conclusion I wish it distinctly understood that there has been no attempt made to dictate to me by any one and such charges are only malicious propaganda. I have sought only to reach a decision which I believed would be best not only for that section particularly concerned but also for the entire city.

Fare Hearings Begun

The Public Service Commission has started to hold a series of hearings in Buffalo on the complaint of the municipal authorities against the rate of fare now charged on the local lines of the International Railway. The municipal authorities hope for the return of the 5-cent fare. Seven cents or four tokens for 25 cents is now charged by the company. At the initial hearing before the commission experts on behalf of the International presented evidence tending to prove that the valuation of the company is $96,539,165. W. K. Meyers, valuation manager of Mitten Management, Inc., and the Philadelphia (Pa.) Rapid Transit Company, identified the bound volumes, consisting of maps, cost sheets, etc., in order to substantiate the valuation figures. Land owned by the railway company in Buffalo, exclusive of buildings, was valued by realty experts at $1,936,000. On the rights-of-way outside the city, but near by, the experts placed a valuation of $1,111,000.

Among those who attended the hearing were C. J. Joyce, chief counsel for the Mitten interests in Philadelphia; Thomas Penney of Penney, Killeen & Ney, attorneys for the International and former president of the company; Herbert G. Tulley, president, and others. The case has been pending before the commission since 1918.

500 Jitneys Operate in Detroit Under Protection of Injunction

Jitneys are operating on the main thoroughfares of the city of Detroit under their 1922 licenses in spite of the ordinance passed by the City Council and approved by former Mayor James Couzens. The intention of this measure was to banish the jitneys, Oct. 1 last, from the streets on which there are car lines. The service now handled by the jitneys over Woodward Avenue, Jefferson Avenue, Grand River Avenue, and Fort Street is a result of an order issued by Judge Moynihan on Sept. 30, in the form of a temporary injunction restraining the Mayor, police commissioner and the sheriff from enforcing the ordinance.

The petition for the order was taken to Judge Moynihan by officers of the Red Star Motor Driver's Association and the Blue Ribbon Auto Driver's Association. The contention was that the ordinance was "unreasonable and arbitrary" and unconstitutional in that it extended immunities and privileges to one portion of a certain class and denied such immunities and privileges to others. It was sought to substantiate this statement with the assertion that buses owned by the Detroit Motor Bus Company were "allowed to operate on the several streets and avenues of the city of Detroit giving the same service and receiving the same fare as is prohibited the jitneuers." At the time jitney service was to have been stopped there were approximately 510 in operation. This number has been somewhat decreased so that there are now between 400 and 500 jitneys in operation.

A petition was filed in the Circuit Court by Corporation Counsel Clarence E. Wilcox in an effort to dissolve the injunction against the city of Detroit which restrained the officials from enforcing the new ordinance. The hearing on the motion was postponed, both sides being agreeable at the time to having the hearing adjourned.

Action on a proposed jitney and bus ordinance for the city of Highland Park, where the Ford plant is located, was postponed following a conference of the City Council with representatives of the transportation men. A loading station plan, designed to eliminate all objectional features of the bus and jitney traffic, was put into effect. Two loading stations were established in front of the Ford plant.

Mayor Wants Buffalo Motorized

Gradual replacement of trolley cars by motor buses by the International Railway in Buffalo is proposed by Mayor Frank X. Schwab. The problem already has been discussed by the Mayor with Herbert G. Tulley, president of the International, and other railway officials. Mayor Schwab's plan is to have the traction company purchase two motor buses as each trolley car becomes worn out. It was declared that 800 buses would provide adequate service for the city. Rails and wires would be removed as the service gradually becomes motorized, which Mayor Schwab thinks would be within three years.

Buffalo's Mayor has gone to the extent of obtaining tentative figures on the cost of the plan. Motor buses have been offered to the city at $6,000 each and the Mayor believes they could be purchased as low as $5,000 if bought in large lots. The Mayor believes that $8,000,000 would adequately motorize the railway company's lines in Buffalo. Mayor Schwab says that the speed of motor buses is from 25 to 50 per cent greater than electric cars.

All of the Buffalo newspapers used Mayor Schwab's plan to motorize the traction service in Buffalo as the basis of extended editorial comment. Under the caption of "Is the Trolley Extinct?" the *Express* said in part:

Are the present transportation troubles a struggle between electric power and gasoline, like the old effort of the trolley to displace the horse car? The Mayor evidently thinks that is the case and is advising the company itself to be the medium for the transformation. But a lot of ideas look good on paper which do not work out well in practice. Buffalonians will need a few years to think on the subject and some demonstrations before they will conclude the trolley car is a back number.

"Scrapping the Trolley" is the caption of the editorial appearing in the *Commercial*. It said, in part:

While there is much to be said for the motor bus as an instrument for supplement service, street car corporations will be slow to scrap the trolley. In the first place, the street car as now operated is the cheapest unit that has yet been devised for this sort of transportation. The motor bus may be operated more speedily, but when the Mayor talks about a 5-cent fare in a gasoline motor car he is talking what he would like to see done, not about what has yet been accomplished.

"It might be feasible for the International to run a line of buses on the main arteries of traffic during rush hours to relieve the trolley car congestion for those who do not object to paying a 10-cent fare and are willing to run the risks incurred and put up with certain inevitable inconveniences. But it will be a long time before the trolley is thrown upon the junk pile where the old horse car now lies."

Washington Company Seeks to Justify Use of One-Man Cars

The Public Utilities Commission of the District of Columbia will send its traffic engineer, R. G. Klotz, on an inspection tour of other cities where one-man cars are in operation before deciding the fate of that type of conveyance in Washington. This was intimated by Col. Keller, chairman of the commission, on Feb. 21, after listening all day to testimony for and against the one-man car.

Practically the entire afternoon ses-

sion was devoted to the presentation of evidence by the Washington Railway & Electric Company to refute arguments advanced by citizens' associations that one-man cars are unsafe, uncomfortable and slow in getting over the rails.

John H. Hanna, vice-president of the Capital Traction Company, made a strong witness for the Washington Railway & Electric Company. Although his company does not operate one-man cars, Mr. Hanna said:

> If we were in the market for new equipment we probably would buy that type of car. I believe there are some of our lines where one-man cars could be operated today.

William F. Ham, president of the Washington Railway & Electric, presented voluminous testimony to show that one-man cars he is operating are the most modern cars of that type in the country, and that they are safe. He testified that the company will have seventy one-man cars in service this year and should save approximately $150,000 by their use. In answer to questions from William McK. Clayton of the Federation of Citizens' Association Mr. Ham testified that this saving would not make possible an immediate reduction in fare.

The company called to the stand Henry G. Bradlee of the Stone & Webster properties and C. E. Morgan, vice-president of the Brooklyn (N. Y.) surface lines, to testify to the successful operation of one-man cars outside of Washington.

Five-Cent Fare in Seattle—First Day Shows Increased Traffic

The Seattle (Wash.) Municipal Railway on March 1 returned to the 5-cent fare. The first day's receipts showed a slight increase in traffic on most of the lines in the city. This was particularly true on short hauls. The 5-cent fare is the "straight" fare; transfer tokens are sold at 6¼ cents or four for 25 cents. These transfers are good for use from one car line to another, and in addition a second transfer may be obtained on the 6¼-cent fare, if a double transfer is necessary.

The fare for school children remains at 3 cents cash or 2½ cents with tokens. Children under fifteen years of age, upon presentation of certificates signed by their Sunday school superintendent, may ride between the hours of 7 a.m. and 2 p.m. on Sundays at the regular school fare. Transfers are issued upon the payment of 5-cent fare to and from the feeder lines in the city. However, when issuing the transfer, conductor detaches a coupon, indicating that no further transfer privilege is to be allowed.

On the Lake Burien line outside the city limits two tokens will be used, one white metal, for the regular fare, and the other bronze metal if a transfer is desired. The white token is for the ride to the city limits, the bronze for the city ride and transfer.

With the passage of an emergency ordinance, the City Council provided for a 5-cent fare on the municipally owned bus lines, with the same transfer privileges to and from the buses as to street cars. A passenger may now board a bus at one end of the town, transfer to a street car line, transfer to another car line downtown and to a bus line at some other point in the city, all for the payment of 6¼ cents.

D. W. Henderson, superintendent of the railway, announces that if an increase in traffic justifies, railway service can be increased at least 20 per cent at once. Fifty additional cars now undergoing slight repairs can be placed in operation on short notice.

Fare Ordinance Defeated — No Restoration of Service in Sight

At a special election in East Liverpool, Ohio, on Feb. 27, a councilmanic ordinance granting the Steubenville, East Liverpool & Beaver Valley Traction Company a fare increase in Liverpool was defeated, lagging 250 votes behind. The defeat of the measure practically means the end of overtures for restoration of street car service, suspended since May 1.

When the final count was made after the election the vote for the ordinance was 2,277, and 2,527 votes were cast against its passage. It carried by a narrow margin in the downtown wards, but the East End, the stronghold of the street car men, dealt the measure its death blow. A bitter fight had been waged previous to the special referendum by those for and against its passage. Despite the apparent interest in the controversy, the vote polled was lighter than that when the city defeated an ordinance containing the public utilities clause.

The ordinance voted on a proposed 7-cent city fare, a 10-cent intercity fare and a 1-cent transfer. It was a councilmanic ordinance, the passage of which, it was thought, would bring an end to the traction tie-up, which on election day entered its 103d day.

With the defeat of the ordinance the end of the tie-up seems more remote than ever. The failure of the measure nullifies the final step taken by the City Council to restore traction service, and since the company and its employees have failed to reach a pre-election agreement, all hope of an early settlement has dwindled.

When they learned the result of the referendum the traction officials declared that it appeared as though the people of East Liverpool did not want street cars. It was declared that the people would have their wish.

The traction company officials reiterated their statements that no attempts would be made to operate cars, stating that not a single move would be made to give the city car service until it manifested a desire for it.

After the measure was defeated there was a suggestion that the ordinance might be passed by the Council with an emergency clause, but the general belief is that that will not be the case and that the ordinance will receive no further consideration.

Wants to Try Pass Plan.—The Walla Walla (Wash.) Valley Traction Company has applied to the Department of Public Works for permission to experiment for thirty days with the $1 weekly pass system on its line. The company now charges a 10-cent cash fare and asks the privilege of trying the pass system with authority to return to cash fare if results are not satisfactory.

Have Extended Bus Service.—Motor bus operation between DeKalb and Geneva, Ill., has now been extended to Aurora to cover the entire territory of the Chicago, Aurora & DeKalb Railroad which recently, discontinued service. J. E. Joseph, who purchased the traction line, was allowed ninety days by the court to determine whether to junk the line or resume operation.

Syracuse Baiting Its Railway Again.—The announcement of a surplus of $244,228 for the New York State Railways for 1922 after the payment of charges, taxes and dividends was the signal for a new attack for a lower fare by the city authorities. Corporation Counsel Frank J. Cregg, who has been leading the fight for a 5-cent fare, said that the report showed more than a "good return." He is also demanding restoration of two-man cars. Adrian M. Landman, adviser to the city, will investigate the company affairs in connection with the expiration of 7-cent fare period on April 1.

Returns to Higher Fare.—Fare in Waterloo, Iowa, was raised from 7 cents to the old charge of 10 cents in March, C. D. Cass, president of the Waterloo, Cedar Falls & Northern Railway, notified the City Council. In December last year the company agreed upon the recommendation of the Council to lower the fare to 7 cents for a two months test period to determine whether or not such a move would increase the revenue of the company by inducing a larger number of people to ride. Monthly and daily reports of the number of passengers carried and the gross revenue submitted to the Council disclosed the fact that the number of passengers did increase slightly but that the volume of increased riding was not sufficient to change the financial result.

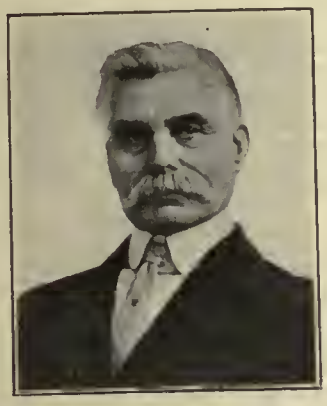
Hearing on Railways' Rights to Run Buses.—A hearing was held recently on the bill introduced in the New Jersey Legislature granting permission to electric railways to operate buses. The bill was drawn by Assemblyman David F. Barkman at the request of Otto G. Schultz, manager of the Morris County Traction Company, Dover. Mr. Schultz, in discussing the bill, said that a traction company may wish to use the bus in supplementary service in territory where trolley lines could not profitably be built, and that these extensions should be in the hands of responsible people. So far as his company was concerned it was in the transportation business and wished to give the public the best possible service. As Mr. Schultz saw it the bill was in the interest of the public. He appealed to the members to pass the measure.

Personal Items

Chris Dahl, Master Mechanic

Muskegon Man Has Served Local Railway There Thirty-five Years—Sons Also with Company

Chris Dahl, aged seventy-three, is probably the oldest master mechanic, both in point of service and years, employed by an electric railway in the United States. Mr. Dahl does not believe in changing jobs. He started to work for the Muskegon Traction & Lighting Company, Muskegon, Mich., in 1888, when horse cars were in use. He is still at work for the company. Not only has Mr. Dahl held the job for thirty-five years, but he lives in the house he constructed for himself in 1871 across from the carhouse.



Chris Dahl

"I don't believe in changing jobs if you are satisfied," said Mr. Dahl as he knocked off work at the shops the other day. "I have always remained here, for I like my work."

In view of the fact that the local line at Muskegon was the first in Michigan to adopt electricity and one of the first in the United States to use that form of propulsion, Mr. Dahl comes by his record without much chance for dispute.

"In 1888," said Mr. Dahl, "I started keeping the old horse cars in shape. In 1891 the horse cars gave way to the queer machine propelled by electricity. State officials were here that day and great crowds gathered to see the strange car. Just after the car started it come to a stop. No one could learn the cause. There were shouts to bring out the horses and much good natured joking. Finally, somebody placed the trolley on the wire and the car was started again, amid applause.

"People lined the streets for days in order to ride on the cars. Joy riding was a popular sport in those days just as it is now, only the vehicle then was a different one from that used now. I remember the next year Battle Creek obtained its electric line. They were still using horse cars in Detroit and most other cities.

"You know, we didn't know much about electricity in those days. There were no books on the subject or instruction such as the present worker has. You had to experiment. It was the only way to learn. Often in those days something happened and it took hours to learn the trouble.

"People didn't complain in the old days as much as they do at present. it seems. They accepted things with better grace. All the tools I had in the shop at first were a grindstone and a hand drill. Most of the work was sent out to shops."

Mr. Dahl has seen twelve superintendents go and come during his time and he recalled that as a little girl the mother of E. H. Hammer, present secretary and treasurer of the company, was present at his wedding. Mr. Dahl has been quick to appreciate new machinery, and he is always pleased when the latest tools are purchased by the company for use by him on his job.

The aged mechanic supervises all the work at the local shop and he takes great pride in the ability of his two sons, Alfred and Oscar, who are his assistants.

"Mighty good boys, but they still come to me when they get stuck on a job," said Mr. Dahl with a smile.

Mr. Ready Succeeds Mr. Sachse on California Commission

Lester S. Ready has been made chief engineer of the California State Railroad Commission. He succeeds Richard Sachse, resigned, who will take up private practice in Los Angeles and handle the appraisal of the local lines of the Los Angeles Railway and the Pacific Electric Railway in Los Angeles with a view of the unification of the properties of these two systems so far as local service in Los Angeles is concerned. Mr. Ready is thirty-four years of age. He has served for ten years as an assistant engineer on the commission, in which capacity he has devoted a large amount of time to the gas and electrical division of the commission's engineering department. In October, 1919, Mr. Ready was promoted from assistant engineer to assistant chief engineer. He was graduated from the University of California in 1912. He is a native of California.

O. R. Hill, formerly master mechanic of the Rockford & Interurban Railway, Rockford, Ill., has now the title of superintendent of equipment.

W. A. Underwood has succeeded O. W. Rudin as electrical and signal engineer of the Chicago, Lake Shore & South Bend Railway, Michigan City, Ind.

R. W. Williams District Manager

Appointed by Westinghouse Air Brake Company to Succeed the Late Mr. Adreon in Southwest

R. W. Williams has been appointed to the office of Southwestern district manager for both the Westinghouse Air Brake Company and the Westinghouse Traction Brake Company, with headquarters in St. Louis. This is the position recently made vacant by the sudden death of R. E. Adreon, who, in addition to his duties as president of the American Brake Company, had held the title of acting Southwestern manager since C. P. Cass left the St. Louis office of the Air Brake Company several years ago to become president of the Westinghouse Pacific Coast Brake Company, at Emeryville, Calif.

Coincident with the announcement of Mr. Williams' promotion in the Air Brake Company, the American Brake Company announced his election as vice-president of that organization.



R. W. Williams

Mr. Williams has been connected with the Westinghouse Air Brake Company since April 1, 1902, when he went to Wilmerding to accept the position of secretary to John F. Miller, now vice-chairman of the board of directors.

Mr. Williams was born in Renovo, Pa., in 1878. His boyhood was spent in Williamsport, Pa., where he attended public school. He was graduated from high school with the class of 1897 and immediately entered the employ of the Pennsylvania Railroad, serving in the freight and maintenance-of-way departments at Williamsport until joining the Air Brake Company.

After remaining in the general offices of the Air Brake Company at Wilmerding for seven years, he was transferred to the Southeastern district office in Pittsburgh. In 1910 he went to the Cincinnati office and two years later was appointed representative and assigned to the Atlanta office. He returned to the Pittsburgh office in September, 1920, where he has served since.

Mr. Williams is widely known in railway and traction circles and is actively identified with a number of clubs and

associations, among which are included the American Electric Railway Association, the Central Electric Railway Association, the Air Brake Association, Railway Club of Pittsburgh, Pittsburgh Athletic Association and the Edgewood Country Club.

Change in Dubuque Officers

Albert Emanuel Heads Dubuque Electric Company, with O. H. Simonds Vice-President

At a recent meeting of the board of directors of the Dubuque (Iowa) Electric Company, I. C. Elston, Jr., president of the company for the last seven years, withdrew from any further active connection with the operation of the local utility.

The action is a further manifestation of Mr. Elston's desire to relieve himself of the cares and responsibilities which for many years have rested upon him. More than a year ago he withdrew from the presidency of the investment banking house of Elston, Allyn & Company. About the same time he disposed of his utility property at St. Charles, and more recently turned over the management of the electric light and street railway company at Vicksburg, Miss., to operators and owners of several other utitlities in the South.

Mr. Elston has been succeeded as president of the Dubuque company by Albert Emanuel, New York, chief executive of utility companies elsewhere in the West and the purchaser of a controlling interest in the Dubuque Company as noted elsewhere in this issue.

O. H. Simonds, general manager of the company at Dubuque for the last five years, will continue in that position, and in addition becomes vice-president of the local company and a member of its board of directors. This means that much company business formerly handled at Chicago will hereafter be done in Dubuque. Mr. Simonds said:

> The change in presidency of the company will not affect the policy of the present management or the local personnel of the company. As heretofore, we always will have the best interests of the city at heart. In fact, there is a community of interest between any city and its utility companies, for one cannot prosper without the other. We desire sympathetic co-operation and assistance to help us to serve the people of Dubuque adequately and satisfactorily and to aid in the progress of our city.

James Stewart has succeeded J. H. McCahan as roadmaster of the Topeka (Kan.) Railway.

F. W. Broerman has replaced John Moore as roadmaster of the Chicago, Ottawa & Peoria Railway, Ottawa, Ill.

Robert W. Vote has replaced George W. Wilson as auditor of the Evansville & Ohio Valley Railway, Evansville, Ind., and of the Owensboro City Railroad, controlled by the former property.

B. B. Kraus has succeeded D. Zerhusen as purchasing agent of the Washington, Baltimore & Annapolis Electric Railroad, Annapolis, Md. H. T. Connolly, formerly superintendent of power, is now electrical engineer.

Mr. Masengill Appointed Superintendent

W. T. Masengill was made superintendent and general freight and passenger agent of the Pacific Coast Railway, San Luis Obispo, Calif., on Feb. 1. This promotion came after only seven months' service with the company as Mr. Masengill entered its employ in July, 1922, as assistant superintendent. In his new capacity he succeeds J. M. Sims.

Mr. Masengill's association with railway work began in 1897, when he entered the employ of the Southern Pacific Company on its coast division as agent-telegrapher. In 1901 he was promoted to train dispatcher at the office in San Francisco. He served also as chief dispatcher in San Francisco, Tucson, Ariz., Guaymas, Mexico, and San Luis Obispo, Calif., until July of last year, when he joined the forces of the Pacific Coast Railway. The latter property, which operates a little more than 100 miles of track, connects Guadalupe and Santa Maria.



W. T. Masengill

Railway Man of Long Experience Represents Manufacturer

George A. Saylor, has recently been appointed Western sales manager of the electrical division of the Johns-Pratt Company, Hartford. Mr. Saylor accepted his first important position in the electric railway industry in 1900, when he became general superintendent of the Indianapolis, Columbus & Southern Traction Company, in which capacity he served for six years. At that time Mr. Saylor enjoyed the distinction of being the youngest traction superintendent in the United States.

In 1906, when Johns-Manville, Inc., sought sales representation in the West, Mr. Saylor was selected to serve in its electrical department, rising to the position of manager of the electrical, automotive equipment and specialties departments of that company. He devoted much time and effort during these years to advancement of the industry in general, and was particularly active in the Sons of Jove, serving as statesman and Jupiter of the Wisconsin order of that organization. During these years he made a comprehensive study of protective devices, particularly fuses, specializing in the Noark lines, which were at that time sold through Johns-Manville, Inc.

It was logical of Mr. Saylor to accept the position of Western sales manager of the Johns-Pratt Company, for although this meant a change in the name of his principals, he continues to handle the same products, as the Johns-Pratt Company manufactured the Noark line of electrical protective devices and molded insulation from their inception as marketable products.

J. M. Yount, master mechanic of the Market Street Railway, San Francisco, Calif., has been nominated for election to the office of first vice-president of the Pacific Railway Club.

T. G. Hamilton, formerly general superintendent and purchasing agent of the Gary (Ind.) Street Railway, is now performing the duties of vice-president, superintendent and purchasing agent. J. P. Gannon is master mechanic.

Frank D. Conley, formerly superintendent and chief engineer of the DeKalb, Sycamore & Interurban Traction Company, is now known as division manager. Charles Glossof is chief engineer and Elmer Reese is electrical engineer.

Obituary

William Penn White

William Penn White, identified for the last eleven years with the railway department of the General Electric Company at its New York office, died in the Garfield Hospital, Washington, following a major operation. It was while attending the midwinter convention of the American Electric Railway Association in Washington, D. C., that Mr. White first developed the sickness which caused his death on March 6.

Mr. White was born in Washington in 1876. After being graduated from the Lehigh University with the degree of electrical engineer, he entered the employ of the General Electric Company at Schenectady. He served in the testing department, calculating and drafting department and then transferred to the railway engineering department. He was in this work until June, 1912, when he was transferred to commercial work in the railway department of the company in New York. Since his transfer he has been engaged in the activities of the railway department in the Metropolitan district and vicinity.

Mr. White was a member of the American Institute of Electrical Engineers and was also a member of the Engineers' Club of New York and of the Mohawk Club of Schenectady. He had just completed a term as president of the General Electric Club of New York. Mr. White is survived by his wife and three daughters.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

Details of Philadelphia Order for 576 Cars

On Jan. 22 the board of directors of the Philadelphia Rapid Transit Company authorized the lease and purchase by car trust agreement of 576 new cars of which 520 will be passenger cars. A brief note in regard to this order, which is said to be the largest single order for trolley cars ever placed in this country, was made in the Jan. 27 issue of the ELECTRIC RAILWAY JOURNAL. Details regarding these cars and their equipment are now available. Three hundred and eighty-five of these cars are to be for single-end operation and 135 for double-end.

The exact design of the double-end cars has not yet been decided, but the accompanying illustration shows a seating plan and elevation for the single-end type. As will be seen they are of the side-entrance pay-as-you-pass type. Provision will be made so that these cars and also the double-end cars can be operated by one man during off-peak periods.

Both types of cars will be 45 ft. 6 in. over all. The single-end cars will seat fifty-three, while the double-end cars have a seating capacity of forty-four. The type of seats is also different for the two cars. Brill standard Winner double-rod pressed-steel seats will be used for the double-end cars, with wooden slat construction, while the Brill Cleveland type of seats will be used on the single-end cars. These also will be of wooden slat construction.

The estimated weights for the two types are 34,000 lb. for the single-end cars and 35,000 lb. for the double-end cars. The motor and control equipment will be the same for both types.

MANUFACTURERS OF EQUIPMENT, TOGETHER WITH TYPE FURNISHED

Air brakes	G.E. Co.
Armature bearings	Plain
Axles	Carnegie Steel Co.'s heat treated
Bumpers	Six-inch Channel reinforced
Car signal system	Brill's standard and push button contact bases—Faraday Type-E
Car trimmings	Malleable and bronze statuary finish
Center and side bearings	Brill's standard
Conduits and junction boxes	Galvanized
Control	G.E. 2-K-68 with ratchet attachment
Couplers	Drawbar pockets
Curtain fixtures	Curtain Supply Co.'s No. 88
Curtain material	Double face pantasote
Designation signs	Hunter
Door operating mechanism	National Pneumatic Co.
Wheelguards	H. B. Life Guard
Gears and pinions	Tool Steel Gear & Pinion Co.
Hand brakes	Peacock staffless
Heater equipment	Consolidated Car Heating Co.'s
Headlights	Crouse Hinds semaphore lens
Journal bearings	Plain
Journal boxes	Plain cast-iron
Lightning arresters	M. D.
Motors	Two per car, G.E.-275A outside hung
Registers	International Type R-7
Sanders	Ohio Brass Co.
Sash fixtures	Bronze statuary finish
Seats	Brill's standard Winner double rod for double end cars and Brill Cleveland type for single end cars.
Seating material	Wood
Springs	Brill's helical and elliptic
Step treads	Universal anti-slip smooth safety
Trolley catchers	Ohio Brass Co.
Trolley base	Two U. S. No. 14
Trolley wheels	Star Brass Foundry
Trucks	Brill No. 39 E-2
Ventilators	Garland Type C-1 Jr.
Wheels (type and size)	Steel 28-in. and 22-in. diameter
Special devices, etc.	Birney Safety Car devices equipment

DETAILS OF PHILADELPHIA'S NEW CARS

Length over-all	45 ft. 6 in.
Width overall	8 ft. 6 in.
Height, rail to trolley base	11 ft. 0¼ in.
Bolster centers: Double-end cars	22 ft. 6 in.
Single-end cars	24 ft. 6 in.
Truck wheelbase	4 ft. 10 in.
Weight total: Double-end cars	35,000 lb.
Single-end cars	34,000 lb.
Seating capacity:	
Double-end cars	44
Single-end cars	53

The cars will be built by the J. G. Brill Company. The interior trim will be bronze statuary finish, the headlining will be Agasote and the roof will be arch type.

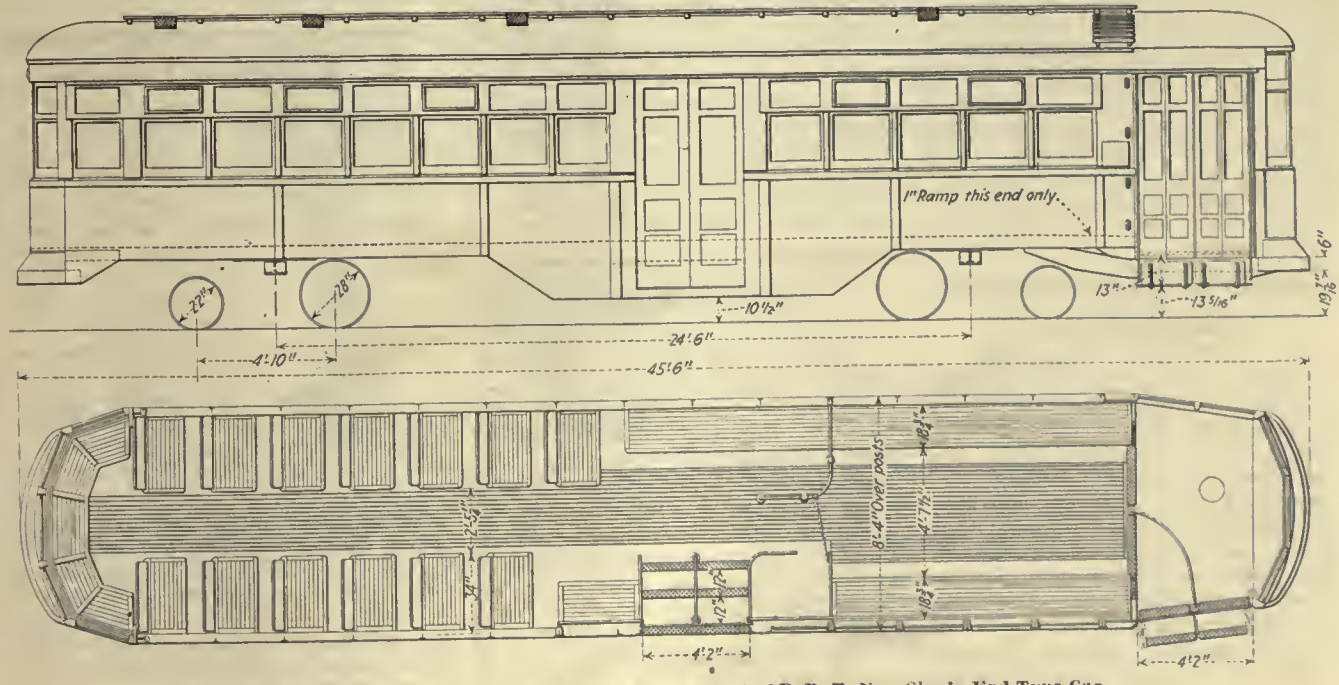
Two G.E. type 275-A motors will be used, with General Electric Company's 2-K-68 control with ratchet attachment. Accompanying tables give details of weights and dimensions, and also details of the equipment which will be furnished.

In addition to the passenger cars, the following double-truck, four-motor, double-end utility cars were ordered:

Twenty-four share-type snow plows.
Ten snow sweepers.
Eight standard differential dump cars and five differential trailers.
Six flat-bottom, drop-side work cars.
One crane car for surface service.
One crane car for elevated service.
One line tower car.

Metal, Coal and Material Prices

Metals—New York	March 6, 1923
Copper, electrolytic, cents per lb.	16.937
Copper wire base, cents per lb.	19.125
Lead, cents per lb.	8.25
Zinc, cents per lb.	8.70
Tin, Straits, cents per lb.	47.00
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$6.175
Somerset mine run, Boston, net tons	3.75
Pittsburgh mine run, Pittsburgh, net tons.	2.75
Franklin, Ill., screenings, Chicago, net tons	2.375
Central, Ill., screenings, Chicago, net tons.	1.30
Kanaas screenings, Kansas City, net tons..	2.625
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	7.50
Weatherproof wire base, N.Y., cents per lb.	19.50
Cement, Chicago net prices, without bags.	$2.20
Linseed oil (5-bbl.lots), N.Y., cents per gal..	1.01
White lead, (100-lb.keg), N.Y., cents per lb.	13.375
Turpentine (bbl. lots), N. Y., per gal.	$1.54



Plan and Elevation Showing Seating Arrangement of P. R. T. New Single-End Type Car

Rolling Stock

Lima (Ohio) Street Railway has received five of a total of twenty one-man cars ordered. The twenty cars are expected to be in operation by April 1.

Pittsburgh, Harmony, Butler & New Castle Railway, Pittsburgh, Pa., has purchased three Packard cars for bus service between New Castle and Ellwood City.

Springfield (Mass.) Street Railway has placed an order with the J. G. Brill Company's Wason Manufacturing Company plant at Springfield for ten new double-truck cars. The company's intention of buying the cars was referred to in the ELECTRIC RAILWAY JOURNAL issue of Feb. 17.

Brooklyn (N. Y.) City Railroad has placed an order with the Westinghouse Electric & Manufacturing Company for fifty-four two-motor equipments and control for motorizing as many cars now in use as trailers. The motors will be the type 535-A, of 60 hp. each, and the control will be type K-68-A arranged for double-end operation. The control will be interlocked with the doors by type 801-E line switches. The 535-A motor is a comparatively new type, which makes possible the use of a 60-hp. motor with 28-in. wheels, which will be the plan followed in Brooklyn. These trailers at present weigh 31,000 lb.

Pacific Electric Railway, Los Angeles, Calif., has just placed an order for ten additional electric freight locomotives, which are to be of the latest improved type and to cost $475,000 for the entire order. Delivery of two of the new locomotives is anticipated within sixty days and it is contemplated the remaining locomotives will be delivered early during the summer. The new locomotives are to be of 60-ton type and will be capable of handling fifty loaded cars on level track. When delivery is completed the company will have a total of fifty-three electric freight locomotives in its freight service. The company has also placed large orders for car equipment, those now in course of construction aggregating an expenditure of $1,750,000. This equipment, delivery of which will commence within a short time, consists of 400 dump cars, 300 box and 150 flat cars.

Track and Roadway

Orange, Tex.—A franchise has been granted on application of the general manager of the Orange Light & Water Company for the construction of a trackless trolley system in Orange.

Buffalo & Lake Erie Traction Company, Erie, Pa., through General Manager Myers, is seeking a franchise for the construction of a double-track line connecting curves in Twenty-first Street from State to Peach Street.

Public Service Railway, Newark, N. J., may be asked to build a trolley loop from Haddon Avenue to King's Highway. A petition has been presented to the borough commissioners of Haddonfield, N. J., asking for this improvement.

Puget Sound International Railway, Everett, Wash., will use steel rails aggregating 360 tons for replacement on the Everett-Seattle interurban line, between Foy and North Park stations. The new rails will be 70-lb. size, replacing 50, 56 and 60-lb. rails.

Market Street Railway, San Francisco, Calif., will begin within thirty days the relaying of rails on Market Street from the Ferry to McAllister. This improvement will mean about 6 miles of single track. Rails, joint plates and other material have been purchased and is already delivered in San Francisco.

Los Angeles (Calif.) Railway has started the construction of an extension from Third and Larchmont Streets along Larchmont to La Brea. The extension involves a little more than a mile of double-track construction. This new track will serve new territory in South Hollywood.

Power Houses, Shops and Buildings

Cleveland (Ohio) Illuminating Company is planning to take over the $1,000,000 power house owned by the Lake Shore Electric Railway in Avon Beach Park, east of Lorain, Ohio.

Oklahoma Union Railway, Tulsa, Okla., expects to build a new interurban depot at Red Fork, Okla. Work will begin within a few weeks. The new depot will be modeled after the passenger depot in West Tulsa, but will be somewhat smaller.

Ohio Valley Electric Railway, Huntington, W. Va., contemplates spending $2,250,000 on additions to the Kenova power plant. This plant now generates all the electric current which the company supplies between Guyandotte, W. Va. and Hanging Rock, Ohio, and demands for service are increasing at such rate, officials say, that additional facilities are imperative. To cover this and other improvements the company is planning an issue of new securities.

Trade Notes

Nichols-Lintern Company, Cleveland, Ohio, has reprinted in the form of a blotter a recent editorial from the ELECTRIC RAILWAY JOURNAL entitled "Work—Thought—Character."

Haskelite Manufacturing Corporation, Chicago, Ill., has received the order for roofing the fifty-two trail cars which have been ordered by the city of Detroit. These roofs will be of the ⅜-in. three-ply construction and will be furnished in five sections per car.

Link-Belt Company, Chicago, Ill., announces a cut of 14 per cent in the price of its portable belt conveyor, the "Cub." The new price is $585 complete with a 2-hp. electric motor. Portable belt conveyors are used for unloading and loading cars, trucks and wagons of any loose material.

Burry Railway Supply Company, Chicago, Ill., reports orders received for Hartman center plates and Perry, Paragon and Peerless side bearings from the following: Philadelphia Rapid Transit Company, Detroit Municipal Railways, Macon Railway & Light Company, American Electric Power Company, Grand Rapids, Grand Haven & Muskegon Railway, Tri-City Railways, Texas Electric Company, Dallas Street Railway, Chicago Surface Lines, British Columbia Electric Railway and the Eastern Wisconsin Railway.

Uehling Instrument Company, Pittsburgh, Pa., manufacturers of CO_2 recorders and other power plant gages, has placed Charles J. Schmid in charge of sales in greater New York and Long Island. Mr. Schmid is well qualified for his duties in this important territory due to his close contact with power plant operators in the interest of fuel economy when formerly in charge of the Boston office. Temporarily Mr. Schmid will make the home office in Paterson, N. J., his headquarters.

B. Olney Hough, for many years past editor of the *American Exporter*, has relinquished that position to establish himself as export counsellor, consultant and adviser to banks, exporters and manufacturers, with offices under the style of B. Olney Hough, Inc., 17 Battery Place, New York. It may be regarded as significant of the esteem in which his opinions and advice are held that his first retainer in his new profession is from the *American Exporter*, for which he will continue to act in a capacity similar to some extent to his former position, as export and technical adviser and writer, with the title of contributing editor.

New Advertising Literature

Wagner Electric Corporation, St. Louis, Mo., has issued descriptive bulletin No. 131, giving instructions for ordering and adjusting repair parts.

Railway Improvement Company, New York, N. Y., has issued an illustrated booklet on the Ransom vacuum oiler. It shows the oiler installed on motors on a large number of properties.

J. G. White Engineering Corporation, New York, N. Y., is distributing a booklet, called Steam Power, which is illustrative and descriptive of some of the more important steam power plants which have been built by this corporation.

W. S. Goodwin Company, Inc., Baltimore, Md., describes in its bulletin N, on steel paving guards, a number of types of steel paving edges. These are designed to preserve the edges of paving of different types, special attention being given to the edges abutting on electric railway track rails.



—from 7 to 70 tons

PEACOCK BRAKES

A Special Type—A Right Type for Each Size and Type of Car

From the Peacock Staffles—a development of recent times for the little safety car—to the Peacock Improved 12/52 type for heaviest interurban and rapid transit cars, there is a Peacock Brake to fit your particular requirements. We have been developing and manufacturing hand-brakes for so many years that we can deliver what's needed in any case.

The Engineering Slant—

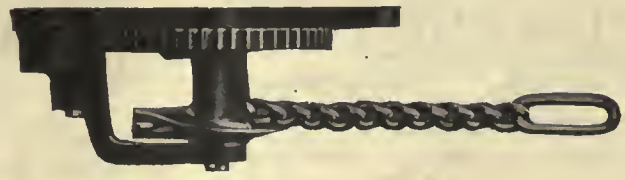
Trained engineers are gradually supplanting the old-fashioned equipment man who knew only what his own experience had taught him. Those who remain are the ones who have learned to do what the trained engineer does—to figure out their equipment problems. Do a little figuring now on brakes for your new cars—find out what braking forces will be necessary to stop the car under worst conditions—*then get the data on Peacock Brakes.*

National Brake Company, Inc.
890 Ellicott Square
Buffalo, N. Y.

Canadian Representative:
Lyman Tube & Supply Company Limited, Montreal, Canada



Peacock Staffless



Peacock Improved 12/52

Bankers and Engineers

Ford, Bacon & Davis
Incorporated
Business Established 1894
115 BROADWAY, New York
PHILADELPHIA CHICAGO SAN FRANCISCO

THE J. G. WHITE ENGINEERING CORPORATION
Engineers—Constructors
Industrial Plants, Buildings, Steam Power Plants, Water Powers, Gas Plants, Steam and Electric Railroads, Transmission Systems
43 Exchange Place, New York

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Incorporated
EXAMINATIONS REPORTS APPRAISALS
ON
INDUSTRIAL AND PUBLIC SERVICE PROPERTIES
NEW YORK BOSTON CHICAGO

JOHN A. BEELER
OPERATING, TRAFFIC AND RATE INVESTIGATIONS
SCHEDULES—CONSTRUCTION—VALUATIONS
OPERATION—MANAGEMENT
52 VANDERBILT AVE., NEW YORK

SANDERSON & PORTER
ENGINEERS
REPORTS, DESIGNS, CONSTRUCTION, MANAGEMENT
HYDRO-ELECTRIC DEVELOPMENTS
RAILWAY, LIGHT and POWER PROPERTIES
CHICAGO NEW YORK SAN FRANCISCO

ENGELHARDT W. HOLST
Consulting Engineer
Appraisals, Reports, Rates, Service Investigation, Studies on Financial and Physical Rehabilitation Reorganization, Operation, Management
683 Atlantic Ave., Boston, Mass.

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ENGINEERS—CONSTRUCTORS
ELECTRICAL—CIVIL—MECHANICAL
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Rate, Traffic and Reorganization Investigations
Fort Wayne, Indiana

ALBERT S. RICHEY
ELECTRIC RAILWAY ENGINEER
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Consulting Engineers
2065-75 Railway Exchange Bldg., St. Louis, Mo.
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Investigations, Appraisals, Expert Testimony, Bridge and Structural Works, Electrification, Grade Crossing Elimination, Foundations, Power Plants

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Design, Construction
Reports, Valuations, Management
NEW YORK PHILADELPHIA CHICAGO

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Consultant on Fares, Buses, Motor Trucks
Originator of unlimited ride, transferable weekly pass. Campaigns handled to make it a success.
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JAMES E. ALLISON & CO.
Consulting Engineers
Specializing in Utility Rate Cases and Reports to Bankers and Investors
1017 Olive St., St. Louis, Mo.

To Secure—

up-to-date speed and safety with old equipment

When converting existing rolling stock for one-man safety car operation, you do not have to replace your present air brake valves with new equipment. E-Z Car Control involves only the addition of a little simple piping, and you have a safety car with emergency devices and selective door control.

What E-Z Car Control Does!

Automatically cuts off power and applies brakes if air pressure gets too low.

Doors "balance" on emergency application of brakes *after* car is stopped.

Safety equipment functions without moving parts under ordinary operating conditions. *This means the virtual elimination of maintenance.*

E-Z Car-Control



Write us for

full details and low cost of this remarkable installation.

E.Z. CAR CONTROL CORPORATION

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Engineers

149 BROADWAY NEW YORK

424 CHESTNUT STREET PHILADELPHIA

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Consulting Accountants

New York and Chicago

Rate Investigations — Consolidations

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Transmission Line and Special Crossing Structures, Catenary Bridges

WRITE FOR OUR NEW DESCRIPTIVE CATALOG

ARCHBOLD-BRADY CO.

Engineers and Contractors SYRACUSE, N. Y.

JOE R. ONG

Consulting Transportation Engineer

Specializing in Traffic Problems and in Methods to Improve Service and Increase Efficiency of Operation

PIQUA, OHIO

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Incorporated

Design and Construction of

Electric Railways, Shops, Power Stations

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Engineer—WASHINGTON, D. C.

TRANSPORTATION

Complete Transit Surveys and Development Programs, adapting Motor-Transport, R.R. Terminal and City Plans. Traffic, Service, Routing, Operation and Valuation.

EXPERIENCE IN 20 CITIES

THE P. EDWARD WISH SERVICE

50 Church St. NEW YORK — *Street Railway Inspection* DETECTIVES — 131 State St. BOSTON



Standard Underground Cable Co.

Manufacturers of

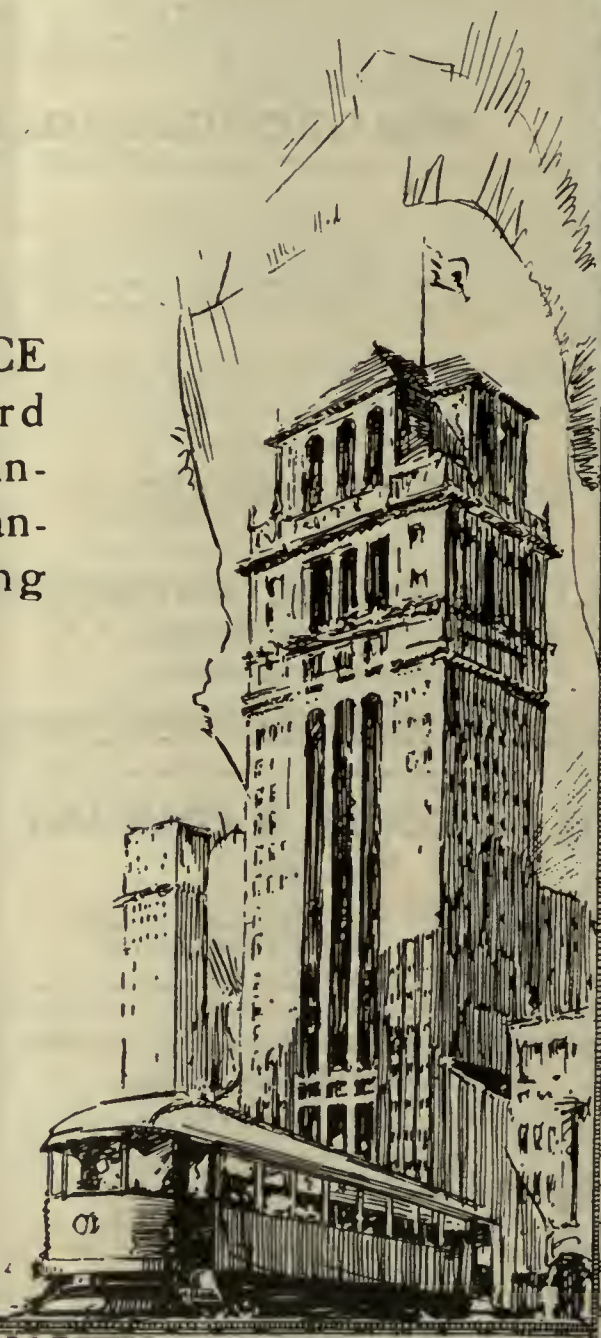
Electric Wires and Cables of all kinds;

also Cable Terminals, Junction Boxes, etc.

Boston, Philadelphia, Pittsburgh, Detroit, New York, San Francisco, Chicago, Washington, St. Louis

When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.

COLLIER SERVICE sustains car card space value by maintaining a nation-wide organization of car advertising experts.



CANDLER BUILDING, THE HOME OF COLLIER SERVICE.

Barron G. Collier
INCORPORATED
CANDLER BLDG NEW YORK



Okulunkulu

The Zulu dead are most always buried in a crouching position facing the east, so they can jump up quickly when *Okulunkulu* the Great Spirit calls from the rising sun.

To be buried in any other position is a severe handicap. The planted one will have about as much chance of getting his share of Okulunkulu's gifts as the late riser in a starvation boarding-house has of getting breakfast.

For the operator buried in brush trouble there is only one thing that can help.

His position is bad from every angle unless he faces the issue squarely.

He must break away from the 'cheap brush' habit. Must realize that motors doing different jobs have certain individual brush requirements. Just as men doing different kinds of work must have specific articles of diet.

Brush trouble is merely a form of motor indigestion which can be cleared up by any Morganite *Prescriptionist* within twenty-four hours!

Morganite Brush Co., Inc.

Main Office and Factory:

519 West 38th Street, New York

DISTRICT ENGINEERS AND AGENTS:

Electric Power Equipment Corp., 13th and Wood Sts., Philadelphia

Electrical Engineering & Mfg. Co., 909 Penn. Ave., Pittsburgh

J. F. Drummey, 75 Pleasant St., Revere, Massachusetts

W. R. Hendey Co., Hoge Bldg., Seattle

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Special Service Sales Company, 502 Delta Bldg., Los Angeles

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Rate-Making For Public Utilities

By Lamar Lyndon, Author of Hydro-electric Power and Storage Battery Engineering.

209 pages, 5½ x 8, $2.00 postpaid.

THIS book is designed to clear up the confusion raised by the numerous conflicting court decisions and rulings on the various problems entering into the regulation of public utilities.

The author's aim has been to clarify the points on which experts and engineers differ in fixing rates for utilities and to indicate the logical basis for figuring each and every factor involved in the problems of valuation and rate-making.

Another New Book!

Depreciation of Public Utility Properties

By Henry Earle Riggs, C.E., Professor of Civil Engineering, University of Michigan.

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THIS book sets forth the new problems in valuation and depreciation of public utility properties brought about by the price fluctuations of 1914 to 1921.

The author traces briefly the history of the regulation of utilities, gives his own interpretation of the distinction which must be made between the replacements necessary because of wear and tear, and actual loss of value, and points out certain important conclusions of the courts with which every one engaged in valuation work should be familiar.

Examine these books for 10 days, FREE!

Free Examination Coupon

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Send me for 10 days' Free Examination, postage charges prepaid, the books checked:

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I agree to remit for the books or return them postpaid within ten days of receipt.

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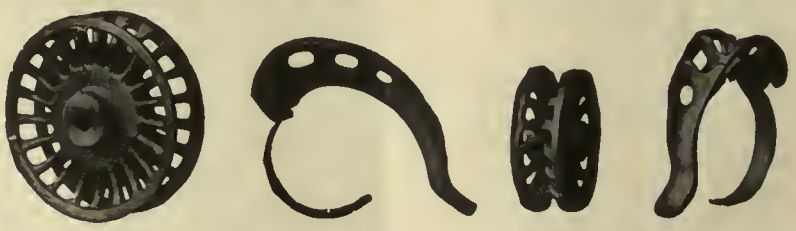
GRIFFIN F. C. S. WHEELS

For Street and Interurban Railways

All of our plants have adequate facilities for fitting wheels to axles

FOUNDRIES:

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LEST YOU FORGET

Last winter's tie-ups from sleet storms

Don't wait until you have a sleet storm and then wish for Nuttall Sleet Wheels and Scrapers. Order them ***now***—be ready. And don't smile at the reminder and forget it. Every winter we express many, many shipments of sleet removing devices, showing that ***some one*** forgets.

NUTTAL—PITTSBURGH

All Westinghouse Electric & Mfg. Co. District offices in the United States are Sales Agents for Nuttall Products.

SYRACUSE CAR TURNSTILE

—on single-end cars



—on double-end cars



—on Peter Witt cars



Uses both ends of any car without paying for conductor

A One-Man Car Necessity!

Delays and slower schedules have been the strongest arguments used against the one-man car. And since larger double-truck cars have been introduced for one-man operation, these difficulties have become more pronounced.

In Syracuse and Utica, N. Y., in Dayton, Ohio, and other places they have overcome these obstacles by the use of the Syracuse Car Turnstile. Now they run cars of largest capacity, with a single operator, on schedules that are little if any slower than when two men were on the car.

When Syracuse Car Turnstiles are installed full utilization is made of entrance and exit facilities at both ends of the car. Instead of having a confused and intermingling mass of jostling people entering and leaving at one end, passengers board at one end, and leave at the other, passing through the car in orderly flow. Pay-enter or pay-leave methods can be used, on any type of car.

Let us show you how the Syracuse Car Turnstile will adapt itself to your own particular type of cars, and your special operating conditions. One-man operation, with turnstiles, offers your biggest opportunity for effecting large economies with your present double-truck cars.

Write us today

THE TURNSTILE CAR CORPORATION
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Specify HALE & KILBURN SEATS

for your new cars

Best seats for City Cars
Interurban Lines, One Man Cars
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Neatest
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Lightest Weight Stationary Steel Seat



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No higher in price than others
Write for particulars

Hale & Kilburn Corporation
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PHILADELPHIA

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Chatter-Proof Brakes on all Baldwin Improved Motor Trucks For Electric Railways



Baldwin Class "AA" Motor Truck, built for the Osaka Railway, Japan.

AMONG the many notable features of Baldwin Electric Motor and Trailer trucks for high speed electric interurban and street railway service, are the brakes and the method of brake suspension. Internationally known as the simplest and best design of brake.

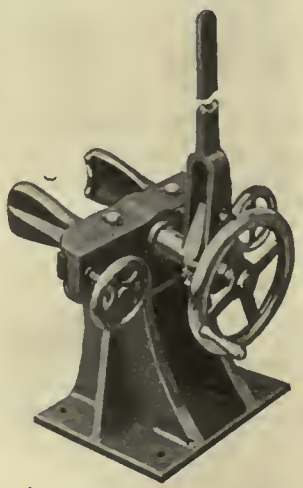
Baldwin Brakes are always to be depended upon

Baldwin representatives in all principal countries of the world.
Detailed information upon request.

THE BALDWIN LOCOMOTIVE WORKS

PHILADELPHIA, U. S. A. Cable Address, "Baldwin, Philadelphia"

964

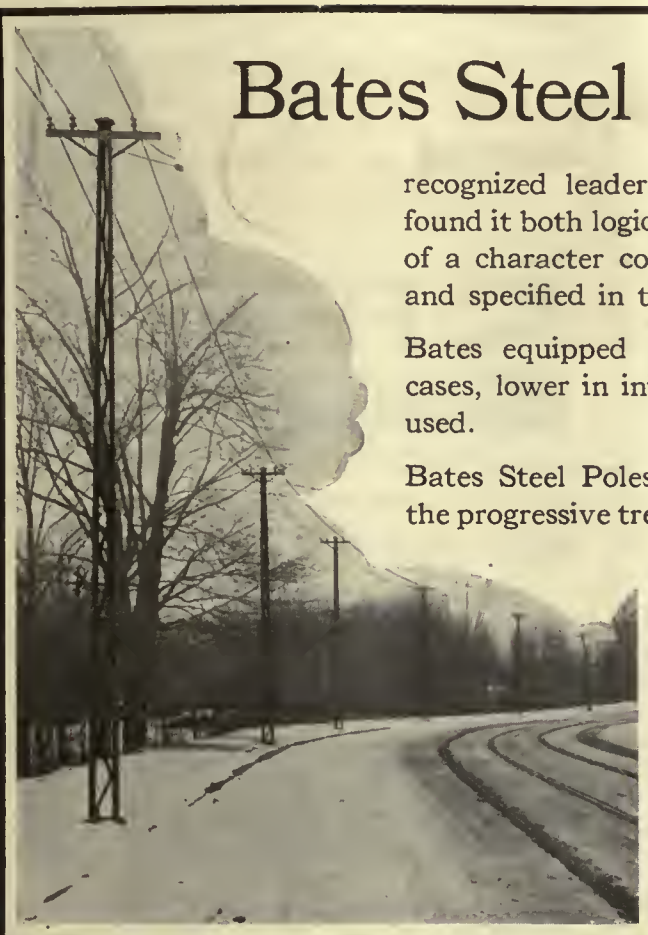


The COLUMBIA Pinion Puller

Will remove pinion from any armature shaft in one minute with proper operation.

COLUMBIA 1892 MACHINE WORKS

Brooklyn N. Y.



Bates Steel Poles are used by

recognized leaders in the electrical industry. They have found it both logical and economical to buy Bates Poles—poles of a character consistent with the high standard demanded and specified in the rest of their equipment.

Bates equipped installations have proved, in innumerable cases, lower in initial costs than if substitute poles had been used.

Bates Steel Poles lend character to installations and reflect the progressive trend of the organization using them.

Bates Expanded Steel Truss Co.

208 South La Salle Street, Chicago, U. S. A.

Bates engineers will gladly co-operate with you in your planning

BATES ONE PIECE EXPANDED STEEL POLES

American Rail Bonds

CROWN
UNITED STATES
TWIN TERMINAL
SOLDER
TRIPLEX

Arc Weld and Flame Weld

Send for new Rail Bond Book

American Steel & Wire Company
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NEW YORK

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TROLLEY WIRE
ANACONDA COPPER MINING COMPANY
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THE AMERICAN BRASS COMPANY
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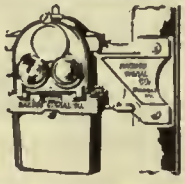
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Standard in the Electric Industries for 35 years
Henry M. Shaw
150 Coit St., Irvington, Newark, N. J.



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JOHN A. ROEBLING'S SONS CO., TRENTON, NEW JERSEY

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'CARNEGIE'
When you think of Steel—think of Carnegie

AUTOMATIC SIGNALS
Highway Crossing Bells
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NACHOD SIGNAL COMPANY, INC.
LOUISVILLE, KY.



BUCKEYE JACKS
high-grade R. R. Track and Car Jacks
The Buckeye Jack Mfg. Co.
Alliance, Ohio

Peirce Forged Steel Pins with Drawn Separable Thimbles
Your best insurance against insulator breakage
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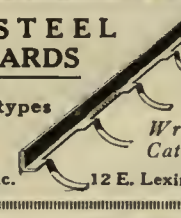
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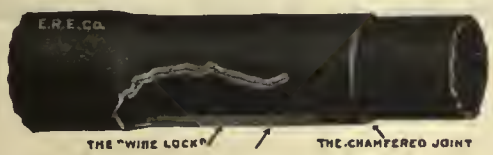
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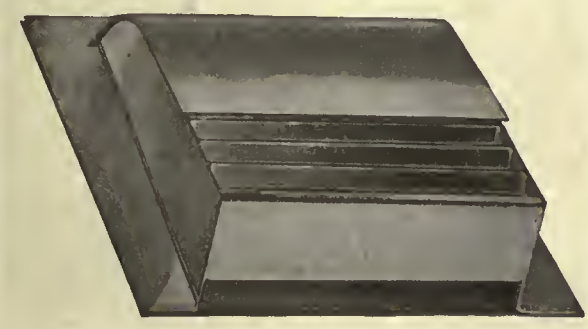
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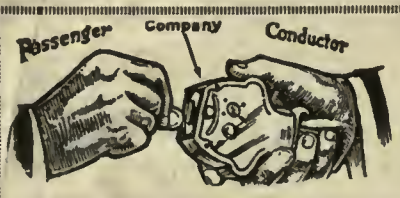
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Bonds, Rail
American Steel & Wire Co.
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National Vulcanized Fibre Co.
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Electric Service Sup. Co.
Internat'l Register Co., The
Roebling's Sons Co., J. A.
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Silver Lake Co.
Cord Connectors & Couplers
Electric Service Sup. Co.
Samson Cordage Works
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Couplers, Car
Brill Co., The J. G.
Ohio Brass Co.
Westinghouse Tr. Br. Co.
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Allis-Chalmers Mfg. Co.
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Crossing Foundations
International Steel Tie Co.
Crossing Frog & Switch
Ramapo Ajax Corp.
Wharton, Jr., & Co., Wm.
Crossing Manganese
Indianapolis Switch & Frog Co.
Ramapo Ajax Corp.
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Crossings Track (See Track) Special Work)
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Allis-Chalmers Mfg. Co.
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Electric Service Sup. Co.
Morton Mfg. Co.
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Wish Service, P. Edward
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Drills, Track
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Electrodes, Steel
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Midvale Steel & Ord. Co.
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National Vulcanized Fibre Co.
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Godwin Co., Inc., W. S.
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Carnegie Steel Co.
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Midvale Steel & Ord. Co.
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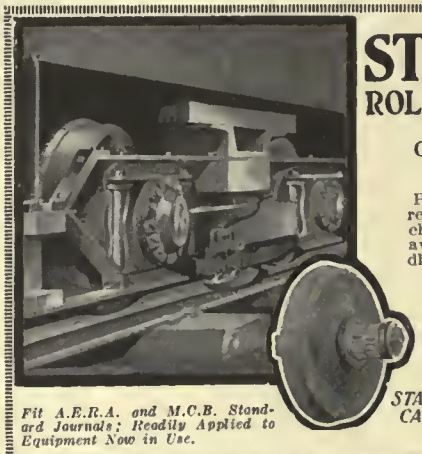
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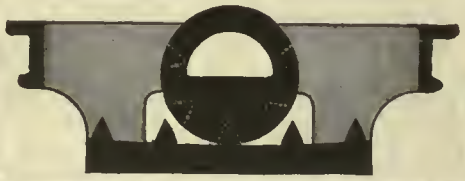
A Single Segment or a Complete Commutator

is turned out with equal care in our shops. The orders we fill differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we can make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.

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Birney Safety Car at Santa Cruz, Cal. Built by the American Car Co.

Maximum Economy

The large number of Birney Safety Cars in service today is evidence of their success. Over 3,600 cars have been built by us for service on over 200 railways. Their introduction at a time when economical operation and increased receipts were necessary proved to be the solution of many difficult financial problems.

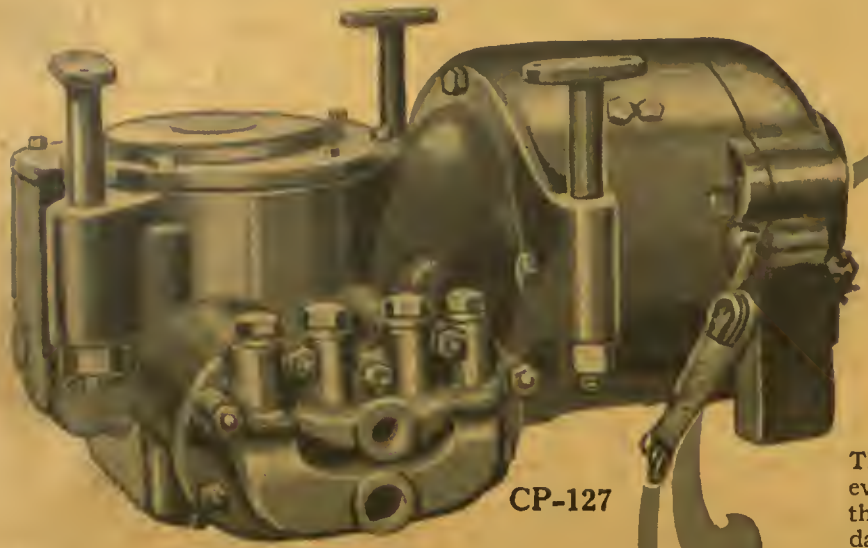
Today the Birney Safety Car is just as capable in providing the most service at the lowest cost as it was when the industry's financial pulse was at its lowest ebb.

Figured on the basis of its seated passenger load the Birney Safety Car is the lightest car yet developed, and consequently the maximum saving in power and maintenance is worth taking advantage of.

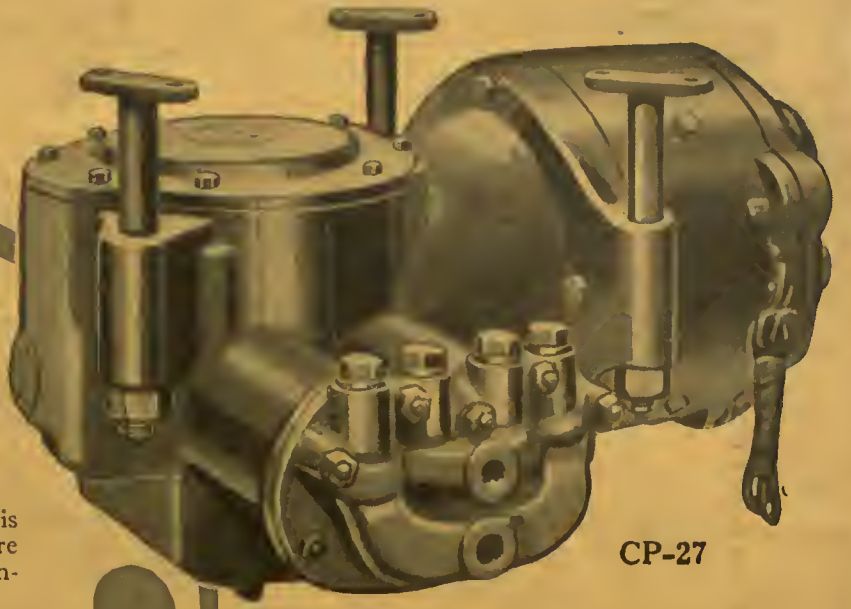
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Type CP—*the Low-Maintenance Compressor*



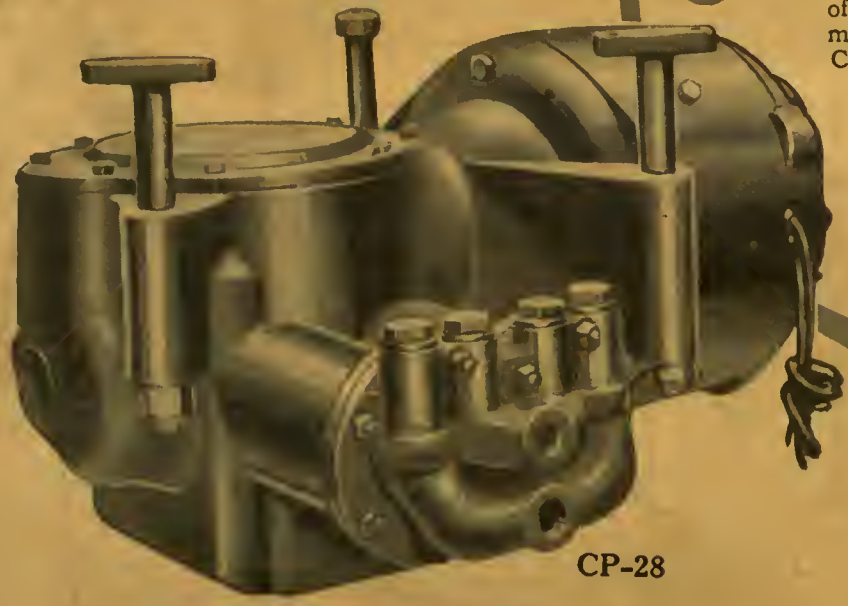
CP-127



CP-27

The popularity of the CP Compressor is evidenced by recent repeat orders for more than 750 new units,—the best recommendation for any equipment.

The CP line includes designs for any class of service, city or interurban. And the maintenance cost averages only $3 per Compressor per year.



CP-28



CP-25

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General Electric Company

General Office

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25-123

ANNUAL MAINTENANCE NUMBER

ELECTRIC RAILWAY JOURNAL

McGraw-Hill Co., Inc. March 17, 1923 Twenty Cents Per Copy

Meet These Authorities On Steel Tie Track Construction

AFTER all, those who *know* the economy of Steel Tie Construction are those who have laid it. On their calm and experienced judgment, as it is displayed in their re-orders, we rest our case with you.

The figures in the table below are compiled from our records and our 1923 Order File, covering a few representative customers who have placed early Spring orders.

General Location Property	First Installation	Total Mileage of Twin Tie Track as of Dec., 1922, Miles	1923 Spring Order, Miles
An Indiana Interurban Company	1911	10	1.75
A Northern Ohio Company	1913	20	3
A Southern New England Company	1915	14½	2.80
A Massachusetts City Company	1915	5.62	0.50
A Southern Colorado Company	1917	4½	0.82
A Michigan Interurban	1917	3	0.75
An Eastern Pennsylvania Company	1918	2	3
A Tidewater Virginia Company	1921	0.11	0.30
A New York Urban Company	1922	2.38	3.75

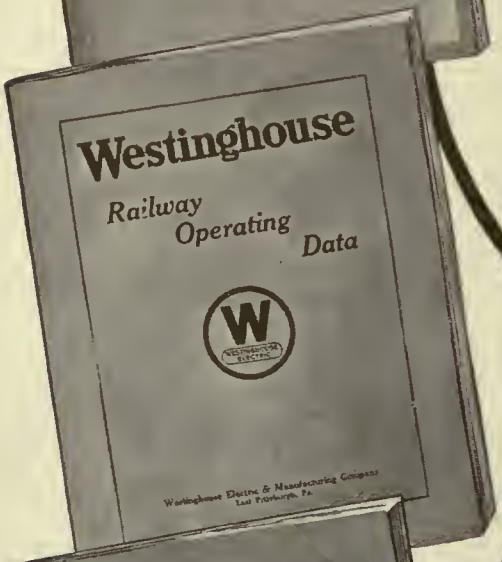
Our sales method is a sincere effort to co-operate in your investigation of Steel Tie Construction as to its performance and cost on other properties and its adaptability to your local conditions. It will be a pleasure to put this service at your disposal.

The International Steel Tie Company
Cleveland, Ohio

Steel Twin Tie Track

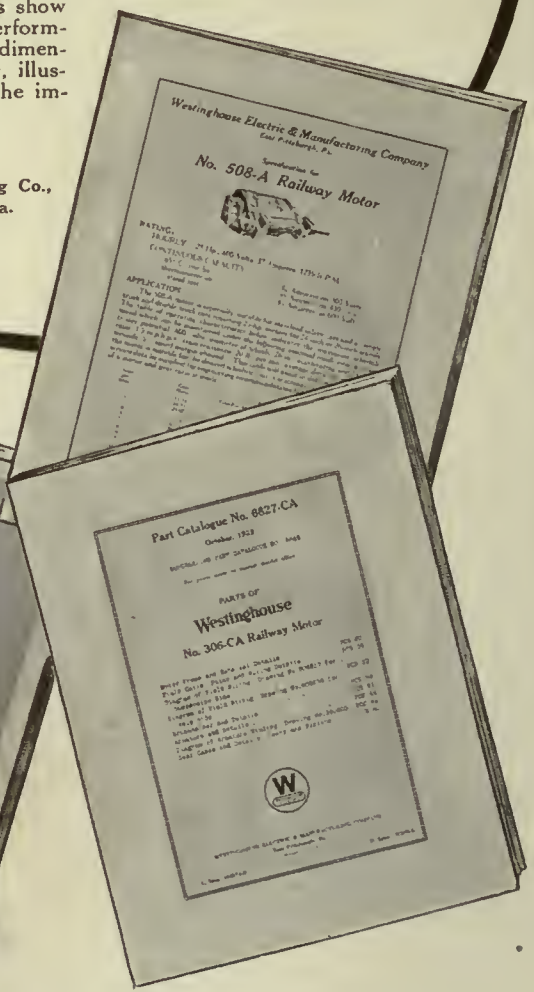
Helpful Hints On Maintenance











Publications

Recognizing the great importance of the proper maintenance of electric railway systems, the Westinghouse Company issues numerous publications to assist railway operating men.

The illustrations show some of the more important of these publications, as follows:

Electric Railway Equipment illustrates more than fifty items of electric railway equipment, showing the important features of each and describing and recommending maintenance practice.

Railway Operating Data are used in many shops as text books for the maintenance of electric railway equipment.

Cars and Car Equipment is a reference guide in the selection of car designs and motor and control applications.

Westinghouse Standard 600-Volt Railway Motors is of great help to superintendents of equipment in selecting from our standard line of motors the proper equipment for new or rehabilitated cars.

Part Catalogues illustrate and describe every part of the motor, and give the style number and other information necessary in ordering renewal parts.

Railway Motor Leaflets show the rating, application, performance curve, and outline dimensions of a specific motor, illustrating and describing the important parts.

Westinghouse
Electric & Manufacturing Co.,
East Pittsburgh, Pa.

Westinghouse

Vol. 61, *No.* 11 New York, March 17, 1923 *Pages* 435-502

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This Issue Illustrates the Scope of Maintenance

MAINTENANCE is one of the biggest problems of any electric railway. Every phase of it must be handled well to keep the wheels turning. Realizing this our annual maintenance number is planned to appeal to a wide class of readers. Two articles on track maintenance, one on line, three on equipment, and three on power comprise the main section of the paper. In addition there are in our regular departments eight pages of shorter maintenance items and shop, track and line kinks.

Nearly a quarter of all a railway spends is for maintenance, so that the importance of keeping down costs cannot be overlooked. Improvements such as those described in this issue point directly to better efficiency, which in turn means reduced costs. While the busy railway man may pay greatest attention to those articles dealing with his own department, he will find many other ideas in this issue that can be applied to his work. The advertising pages also hold practical suggestions displayed so effectively that they are as instructive as the text pages. We cannot urge too strongly that in this day of inflated costs advantage should be taken of the experience of others in ways of reducing costs, such as presented in the two hundred twenty-odd pages of this issue—a book on maintenance in itself.

Circulation of this issue, 7,000 Advertising Index—Alphabetical, 160; Classified, 154-158; Searchlight Section, 150-153

MAINTENANCE

Its Importance

The successful and profitable operation of an electric railway system depends largely upon the proper maintenance of its shops; its rolling stock; its line and track; its power house, and its substations.

No one department is independent of the others—each forms a link in the chain that maintains the operating efficiency of the system. A weak link may mean an interruption to service, causing a loss to the road and dissatisfied patrons.

It is, therefore, manifest that reliability and durability should be the principal considerations when purchasing renewal parts and other apparatus entering into maintenance. Ultimate cost, not first cost, should be the keynote when making purchases.

A brief description of what the Westinghouse Company is doing to assist in efficient electric railway maintenance is given on the pages following.

W WESTINGHOUSE ELECTRIC

Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pa.

Westinghouse

In The Shop


Type SK Motor


Armature


Bearing Bracket


Bearing


Armature Coil


Shunt Field Coil


Brushholder

The maintenance of an electric railway system centers principally in the shop. How quickly and efficiently repairs to rolling stock are made depend upon the quality of the shop equipment, and how well the equipment is maintained.

Westinghouse Type SK Motors and Magnetic Control will be found most reliable and efficient for driving wheel lathes, reversing planers, drill presses and other machine tools in the shop.

For many repair jobs a Westinghouse Arc Welding Equipment will save time and money. Some of the many possibilities where electric welding can be used to advantage are in repairing truck frames; brake hangers; journal boxes; resistors; drawheads and underframing; loose bearing dowels; worn axles, broken armature shafts; broken and worn motor frames; axle brackets; damaged pinion fits of shafts, etc.

Electric ovens for the baking of armatures, commutators, etc., are a shop necessity, and electric solder and electric glue pots should also be a part of every shop equipment. All this apparatus is manufactured by the Westinghouse Company.

W WESTINGHOUSE ELECTRIC


Portable Arc Welding Set

Westinghouse

On The Car


No.532 Motor


Brushholder


ArmatureCoil


Complete Armature


Main Field Coil and Pole

Two fundamental requirements in the upkeep of electric railway motors are, first, a definite program of systematic inspection and, second, a complete stock of renewal parts.

The first will tell when a motor needs attention, the second makes possible proper rehabilitation of the motor.

The wisdom of using only Westinghouse Renewal Parts to maintain Westinghouse motors is evident. All the renewal parts such as armature and field coils, armatures, commutators, brushholders, bearings and other parts entering into the construction of the motor, are the exact duplicates of those used in building the complete motor. They are made with the same skilled workmanship and of the same high-grade material, and with the same tools.

Every car should be provided with adequate protection against lightning. Westinghouse MP Multi - Path arrester, the type K-3 condenser arrester and the type AR electrolytic arrester provide ample protection according to the requirements. When the conditions are severe, Westinghouse Type 19 Choke Coils should be used in connection with the arresters.

W WESTINGHOUSE ELECTRIC


Commutator


Resistor Grid

Westinghouse

On The Line and Track



Type CR Trolley Frog



Type EL Trolley Ear



Cleveland Splicer



Portable Arc Welding Set

Permanency of the overhead line construction is an absolute requirement in the efficient operation of any electric railway system. High rate of acceleration and shock loads must be reckoned with if continuity of operation is to be assured.

Westinghouse line material will keep your overhead lines in good condition. It is designed for the severest service and can be relied upon to stand the strain where traffic is heaviest. Wherever difficult line problems are encountered, such as reverse curves, or long stretches of accurately aligned overhead, Westinghouse Cleveland Splicers and Westinghouse suspensions and ears give the maximum wear and reliability. This applies equally to Westinghouse Trolley Frogs, crossings, section insulators, and all other items used in the construction and maintenance of overhead lines.

The Westinghouse Arc Welding Equipment is an essential and economical tool in maintaining the track system, such as building up material on cupped rails, worn frogs and crossings at points subjected to rapid local wear. It is also used in rail bonding, and welding fishplates to the rails.

W WESTINGHOUSE ELECTRIC



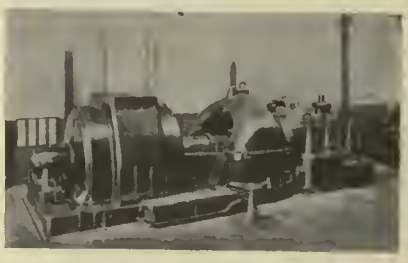
Type KB Section Insulator



Type B-1 Suspension

Westinghouse

In The Power House



Westinghouse Turbine Generator

Perhaps the most important link in the chain of the electric railway system, is the power source—the power generating station, upon which the operation of practically the entire system depends.

It therefore behooves the electric railway company to guarantee the reliability of its service to the public by exercising the utmost care in the selection of power-house equipment.

It is a demonstrated fact that Westinghouse turbine generating equipments and Westinghouse condensers possess a degree of reliability surpassed by none. Upkeep is extremely low. The efficiency is high.

Mechanical stoking is another important means of reducing the power-house maintenance. Westinghouse mechanical stokers are recommended as a means of increasing combustion efficiency, and consequently materially reducing coal bills.

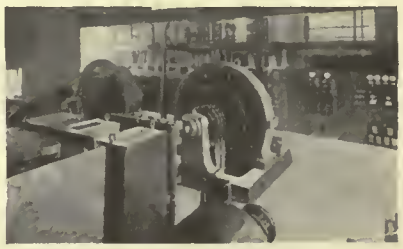
W WESTINGHOUSE ELECTRIC



Westinghouse Underfeed Stokers

Westinghouse

In The Substation



Automatic Substation

In congested metropolitan districts where traffic is heaviest, as well as in sparsely settled neighborhoods, Westinghouse Automatic Railway Substations have a demonstrated universal application.

This equipment is "always on the job." Only an occasional inspection is required. It automatically operates to supply power upon demand and cuts down the supply as requirements diminish.

Not only does this equipment reduce overhead costs, but it greatly improves the service and assures continuity of operation. Since the very beginning of the electric railway industry few improvements have effected such economies and betterment of service as has the Automatic Substation.

Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pa.

Westinghouse



Reducing Railroad Maintenance

Electric railroad executives are taking great interest in Westinghouse Automatic Sub-Station Switching Equipment as a way to reduce excessive operating costs.

Perhaps the most important advantage, in addition to labor economy, is the absolutely reliable protection given to expensive equipment and to service by automatic operation.

Since Westinghouse Automatic Switching Equipment is combined into a unit Switchboard, practically all wiring is done at the factory, thereby reducing installation costs to an absolute minimum.

Write for Leaflet 3998.

Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pennsylvania

Westinghouse



Easy to "get at"

THE ready accessibility to all parts is one of the most marked advantages of Westinghouse DH "Bungalow" Compressors.

Your inspectors find DH Compressors so easy to "get at" that a high state of efficiency, with minimum effort and expense, is always assured.

Three sizes—10, 16 and 25 cu. ft. displacement. Have you seen Publication 2016?

Westinghouse Traction Brake Company

General Offices and Works: Wilmerding, Pa.

OFFICES:

Boston, Mass.
Chicago, Ill.
Columbus, Ohio
Denver, Colo.
Houston, Tex.
Los Angeles
Mexico City
St. Louis, Mo.
St. Paul, Minn.
New York
Pittsburgh
Washington
Seattle
San Francisco

WESTINGHOUSE TRACTION BRAKES

The Secret of the SAFETY CAR



Earns More by Saving More

THE great earning power of the Safety Car is based on its ability to save. Among the chief factors in this respect is the reduction in platform expense.

The saving is not achieved by any sacrifice of service. In fact, the public has come to regard "Safety Car service" as distinctive of the best that can be offered.

You can enjoy the advantages of the Safety Car either by adopting new cars of the standard type or converting existing "two-man" cars, and in either case you will find complete satisfaction in the use of our Air Brake and Safety Car Control Equipment.



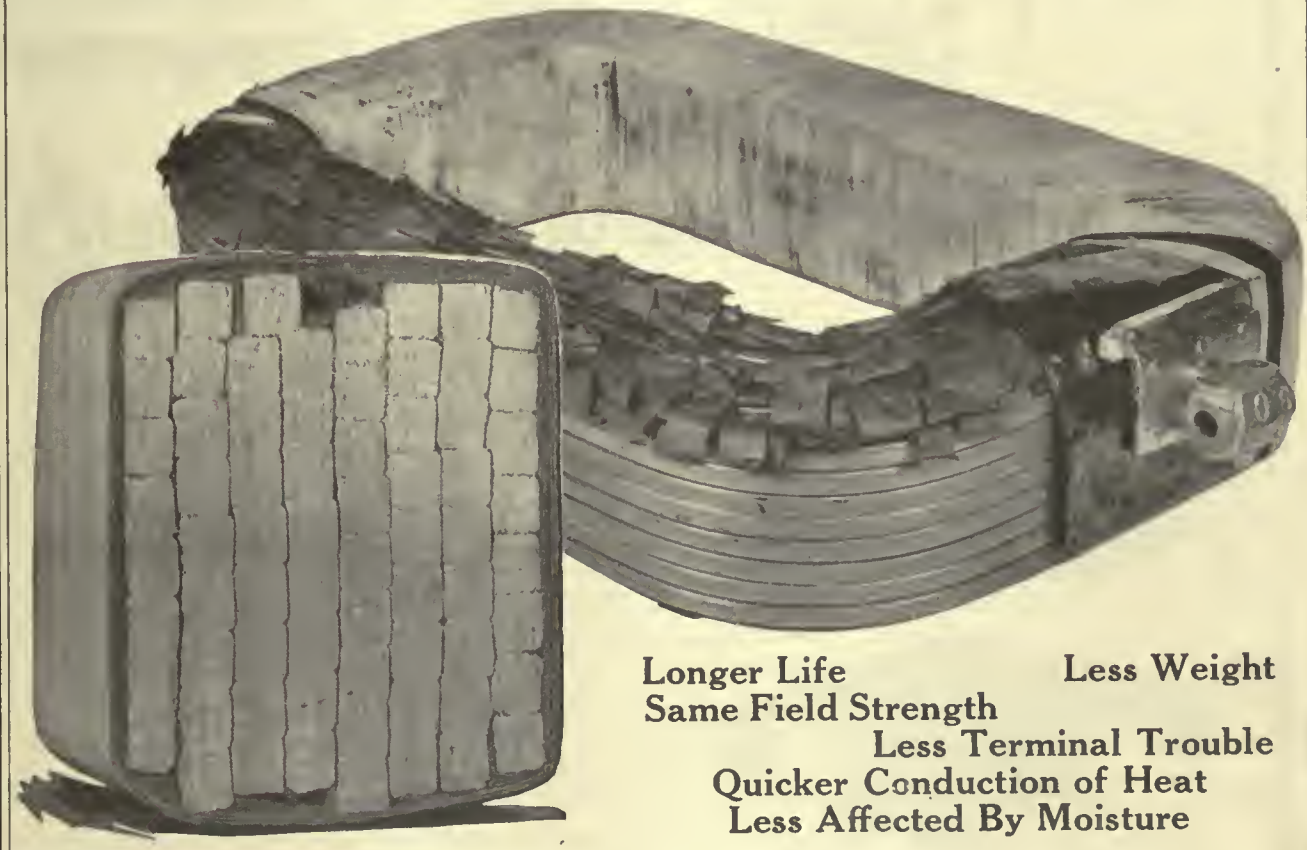
SAFETY CAR DEVICES CO.
OF ST. LOUIS, MO.

Postal and Telegraphic Address:
WILMERDING, PA.

CHICAGO SAN FRANCISCO NEW YORK WASHINGTON PITTSBURGH

It is not a safety car unless equipped with our standard Air Brake and Safety Car Control Devices.

GOING STRONG
ALUMINUM FIELD COILS



Longer Life **Less Weight**
Same Field Strength
Less Terminal Trouble
Quicker Conduction of Heat
Less Affected By Moisture

The quicker distribution of heat in Aluminum field coils is due to an almost solid metallic path to the exterior via large square wires.

With coils of like resistance the heat generated is identical and aluminum coils are wound to closely duplicate copper coils.

They have the same number of turns and repeated tests show that Lind Aluminum coils develop and maintain full field strength.

The Aluminum oxide insulation is an integral part of the conductor—which, means, that these coils are less affected by heat and moisture, and since there is no cotton insulation to char or bake out ***shorted fields are practically eliminated.***

The high specific heat of Aluminum compared with copper is another valuable characteristic, especially in coils that are loaded intermittently, as in Railway Service.

Consider these long-life features in addition to that of saving half the weight of all the field coils of every car in many cases a weight reduction of more than 1000 lb.

Let us quote you prices and answer detailed questions

Economy Electric Devices Company

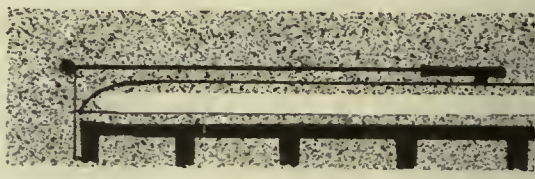
General Sales Agents

Sangamo Economy Railway Meter **Lind Aluminum Field Coils**

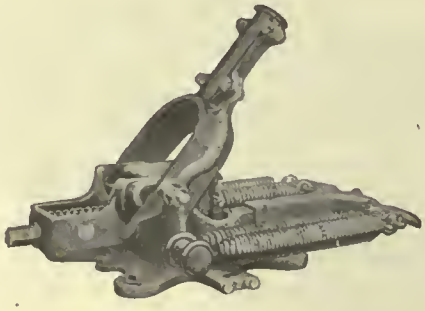
L. E. GOULD, President

1592 Old Colony Building, Chicago

1888



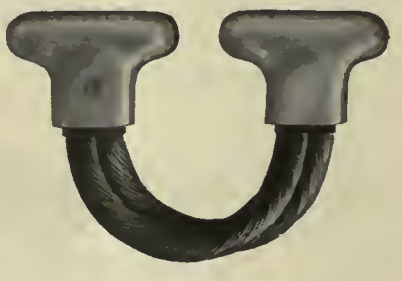
Equipment and materials with the











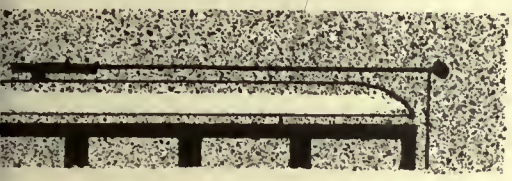
Car Equipment
Line Material
Rail Bonds
High Tension
Insulators

MEMBER AERA

The Ohio Brass Co.
Mansfield, Ohio, U.S.A.

New York Philadelphia Pittsburgh Charleston, W.Va. Chicago Los Angeles San Francisco Paris, France

Products: Trolley Material, Rail Bonds, Electric Railway Car Equipment, High Tension Porcelain Insulators, Third Rail Insulators



1923

O-B mark reduce maintenance costs

Measure the results in ultimate expense

Not by first cost alone, nor unsupported claims, nor yet by the occasional record of a single part, but by the long-run average of the final aggregate figures of life and cost, is determined the best equipment to use.

Behind every piece of material furnished with the **O-B** mark, is the reputation, the standing and the experience of a concern which has been serving electric railways since the advent of the first electric railway cars. Among our hundreds of regular customers are many of the largest companies which were pioneers in the history of the industry. If we can satisfy them, we can satisfy you. Just as they have found that they can figure on greater savings and utmost service with **O-B Equipment**—so also can you.

Ask for O-B quotations on every order!

The Ohio Brass Co.
Mansfield, Ohio, U.S.A.

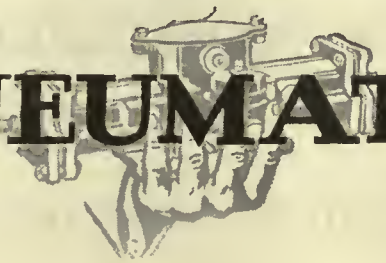
New York Philadelphia Pittsburgh Charleston, W.Va. Chicago Los Angeles San Francisco Paris, France
Products: Trolley Material, Rail Bonds, Electric Railway Car Equipment, High Tension Porcelain Insulators, Third Rail Insulators

Maintenance of intangibles

Maintenance of equipment, way, overhead lines and power plants is only part of the maintenance job.

To maintain
Schedules

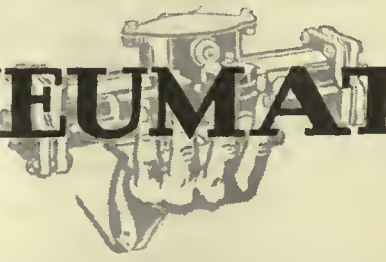
PNEUMATIZE



Doors and steps operated by quick-acting, tireless pneumatic door engines save several seconds at every stop. With five or six stops, per mile, these seconds very quickly add up into minutes on every trip.

To maintain
Good Will

PNEUMATIZE



Faster service with fewer delays, means better satisfaction to the public, and a contented public though intangible is a more valuable asset than any amount of physical property.

National Pneumatic Company, Inc.

Designers, Builders and Installers

Door and Step Control — Door and Step Operating Mechanisms
Motorman's Signal Lights — Safety Interlocking Door Control
Multiple Unit Door Control

Principal Office: 50 Church St., New York

Philadelphia—Colonial Trust Bldg. Chicago—McCormick Building
Works—Rahway, New Jersey

Manufactured in Canada by
Dominion Wheel & Foundries, Ltd., Toronto, Ont.

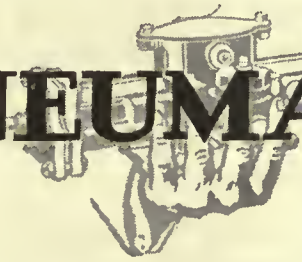
cuts those tangible expenses

There's even more profit in maintaining your valuable intangible assets.

To maintain

Safe Operation

PNEUMATIZE



Accidents of the "boarding and alighting" class, have been practically eliminated, where platform entrances and exits are protected by pneumatically-operated doors and steps, interlocked with car control and emergency devices.

To maintain

One-Man Efficiency

PNEUMATIZE



Fatigue, that enemy of efficiency and so often the occasion of accidents, is minimized when the one-man car operator is aided by National Pneumatic time-saving, labor-saving, economy-producing devices.

National Pneumatic Company, Inc.

Designers, Builders and Installers

Door and Step Control — Door and Step Operating Mechanisms
Motorman's Signal Lights — Safety Interlocking Door Control
Multiple Unit Door Control

Principal Office: 50 Church St., New York

Philadelphia—Colonial Trust Bldg. Chicago—McCormick Building
Works—Rahway, New Jersey

Manufactured in Canada by
Dominion Wheel & Foundries, Ltd., Toronto, Ont.

BUYING
as affected by
SELLING

IT IS to your interest to know that goods are *well sold,* as well as well made. You have to pay the cost of selling just as you have to pay for the cost of manufacturing. Think it over.

And the cost of selling is no small item. In some cases it costs more to sell goods than to make them. The seller who clings to antiquated, expensive methods of selling is no more entitled to your patronage than the one who runs an out-of-date factory, because *you have to pay* the additional costs in either case.

If the waste is to be squeezed out of selling, the buyer cannot escape a share of the responsibility in bringing it about.

THIS means recognizing the efforts of those sellers who have adopted modern, economical methods of selling, and one of these beyond any question is good advertising in good Business Papers.

Advertising not only cuts the cost of selling, but it increases production volume and lowers manufacturing costs. It standardizes quality, and is a guarantee of good faith.

You are invited to consult us freely about Business Papers or Business Paper Advertising

LIST *of* MEMBERS

Each has subscribed to and is maintaining the highest standards of practice in its editorial and advertising service.

Advertising and Selling
American Architect & Architectural Review
American Blacksmith, Auto & Tractor Shop
American Exporter
American Funeral Director
American Hatter
American Machinist
American Paint Journal
American Paint & Oil Dealer
American Printer
American School Board Journal
Architectural Record
Automobile Dealer and Repairer
Automobile Journal
Automotive Industries

Baker's Helper
Baker's Weekly
Boiler Maker (The)
Boot and Shoe Recorder
Brick and Clay Record
Building Age & The Builders Journal
Buildings and Building Management
Building Supply News

Canadian Grocer
Canadian Machinery & Manufacturing News
Canadian Railway & Marine World
Candy and Ice Cream
Chemical & Metallurgical Engineering
Clothier and Furnisher
Coal Age
Concrete
Cotton

Daily Metal Trade
Domestic Engineering
Dry Goods Economist
Drygoodsman
Dry Goods Reporter

Electric Railway Journal
Electrical Merchandising
Electrical Record
Electrical World
Embalmers' Monthly
Engineering and Mining Journal-Press
Engineering News-Record

Factory
Farm Implement News
Fire and Water Engineering
Foundry (The)
Furniture Manufacturer and Artisan

Garment Weekly (The)
Gas Age-Record
Good Furniture Magazine
Grand Rapids Furniture Record

LIST *of* MEMBERS
(continued)

Haberdasher (The)
Hardware Age
Hardware & Metal
Heating and Ventilating Magazine
Hide and Leather
Hospital Management
Hotel Monthly
Hotel Review

Illustrated Milliner
Implement & Tractor Trade Journal
Industrial Arts Magazine
Industrial Engineer
Inland Printer
Iron Age
Iron Trade Review

Lumber
Lumber World Review

Manufacturers' Record
Marine Engineering & Shipping Age
Marine Review
Millinery Trade Review
Mill Supplies
Modern Hospital (The)
Motor Age
Motorcycle and Bicycle Illustrated
Motor Truck
Motor World

National Builder
National Cleaner & Dyer
National Laundry Journal
National Miller
National Petroleum News
Nautical Gazette
Northwest Commercial Bulletin

Oil News
Oil Trade Journal

Power
Power Boating
Power Plant Engineering
Printers' Ink
Purchasing Agent

Railway Age
Railway Electrical Engineer
Railway Engineering & Maintenance
Railway Mechanical Engineer
Railway Signal Engineer
Retail Lumberman
Rock Products
Rubber Age

Sanitary & Heating Engineering
Shoe and Leather Reporter
Shoe Retailer
Southern Engineer
Sporting Goods Dealer

Tea and Coffee Trade Journal
Textile World

Welding Engineer
Western Contractor
Wood-Worker (The)

THE ASSOCIATED BUSINESS PAPERS, INC.

JESSE H. NEAL, *Executive Secretary*

HEADQUARTERS: 220 West 42nd STREET NEW YORK CITY

Lightning Protection



I'm for Real Lightning Protection, believe me!

Beat that Bolt of Lightning with

KEYSTONE Expulsion Arresters



Keystone Expulsion Type Lightning Arrester

THERE is a great deal of experimental work being done which is continually sustaining the now recognized correct method of installing lightning arresters. By the older method, lightning arresters were installed at intervals of approximately every half mile on primary distribution circuits, which did not in any manner afford adequate protection to apparatus, particularly transformers. By the new method of installing lightning arresters, which is for simplicity called "100% Protection", every transformer irrespective of capacity, is protected with an efficient lightning arrester installed preferably on the transformer pole. Only by such a method can adequate lightning protection be secured.

Wherever used, "100% Protection" has been found to result in a tremendous reduction of transformer burnouts and blown primary fuses.

Keystone Expulsion Arresters being designed especially for use where "100% Protection" is followed, incorporate these desirable features:—highly efficient electrically; reasonable in first cost; allow of easy, cheap and quick installation; require a minimum of inspection. They are heartily recommended for this service. Thousands are now in use giving wonderfully efficient and economical protection.

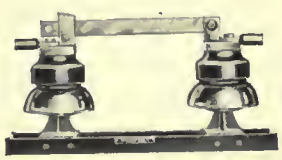
In conjunction with the general use of Expulsion Arresters, Garton-Daniels Lightning Arresters should be used in special installations for the protection of large and important line transformers and for station apparatus.

Both Keystone and Garton-Daniels Arresters are unconditionally guaranteed for one year's service.

Write for Bulletin No. 189.

SOLD BY JOBBERS THE WORLD OVER

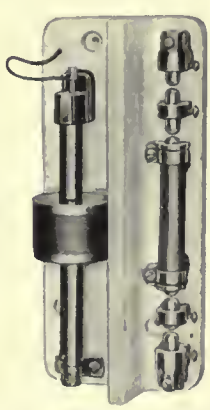
Garton-Daniels High Voltage Choke Coil



Garton-Daniels High Voltage Disconnecting Switch



Garton-Daniels D.C. Pole Arrester Door Removed



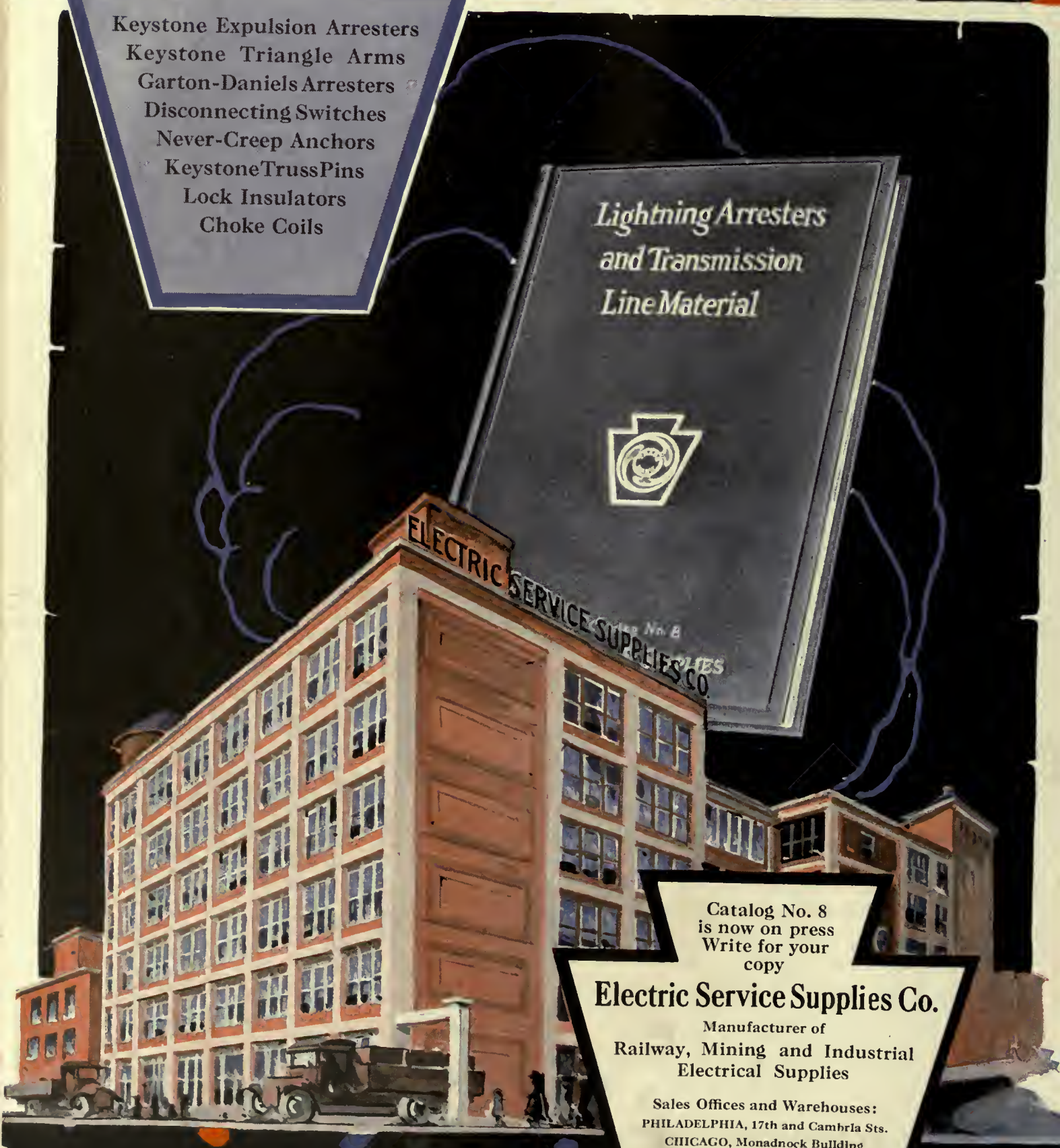
Garton-Daniels A. C. Station Arrester

Electric Service Supplies Co.

The Home of Keystone Products

List of Products

Keystone Expulsion Arresters
Keystone Triangle Arms
Garton-Daniels Arresters
Disconnecting Switches
Never-Creep Anchors
Keystone Truss Pins
Lock Insulators
Choke Coils



Catalog No. 8
is now on press
Write for your
copy

Electric Service Supplies Co.

Manufacturer of
Railway, Mining and Industrial
Electrical Supplies

Sales Offices and Warehouses:
PHILADELPHIA, 17th and Cambria Sts.
CHICAGO, Monadnock Building

Branch Sales Offices:
NEW YORK SCRANTON
BOSTON ATLANTA
PITTSBURGH

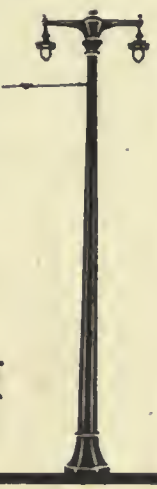


HOLLOWSPUN
Trolley Poles

THE aesthetic effect of an ornamental street lighting installation is largely lost if other poles are allowed to remain in the street. When trolley supports must be provided, a most satisfactory solution can be found in the reinforced concrete pole, which meets every requirement of appearance, and when made by the Hollowspun process, has ample strength.

On account of bad spacing, the poles illustrated above, in West Allis, Wis., were actually built to withstand a strain of two tons applied at a point 21 ft. above the ground. The practical indestructibility of these poles made possible other unusual features in this installation, fully described in our "Hollowspun Standard" No. 7. A copy will be sent on request.





MASSEY CONCRETE PRODUCTS CORPORATION
Peoples Gas Building Chicago



Full Value *for your* Tie Dollar

WHEN you receive International Treated Ties you get full value for your tie dollar. The Ties are hewed from sound, selected timber to resist mechanical wear, treated effectively to resist decay and give long life, graded accurately and marked permanently, all of which serve to guarantee that the railroad company receives exactly what it specifies and pays for.

Reflect for a moment upon the tremendous significance of the concentration of hundreds of thousands of these ties in our tie yards and the dollar and cents value to you of our "Ship today" service from stock of such high grade standard ties.

Our prices are right. Our service is prompt and we stand ready to prove it. Every tie is permanently identified as an International Product by the International Dating Nail.

Let us quote on your tie requirements.

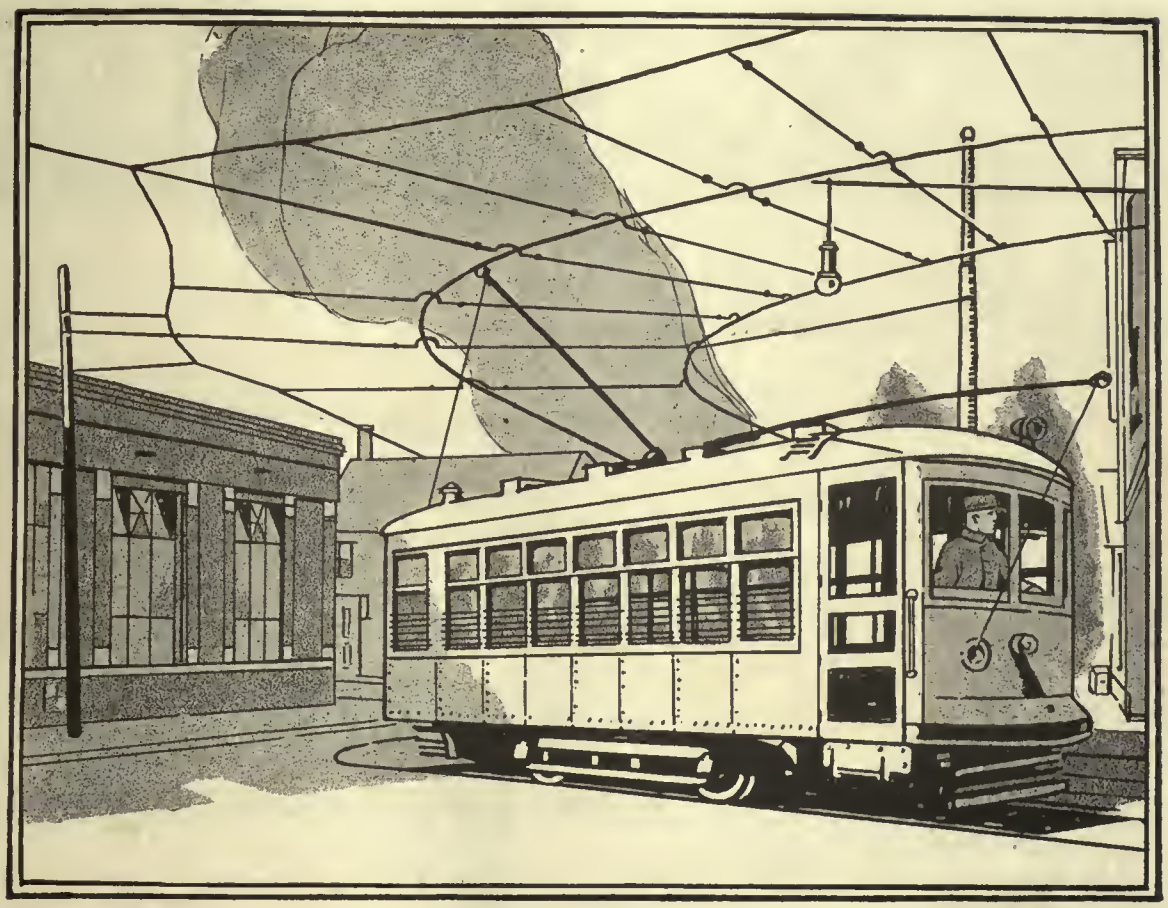
The I. C. C. Co. Dating Nail

International Creosoting & Construction Co.

Main Office: Galveston, Texas

Plants: Texarkana, Texas Beaumont, Texas
Galveston, Texas





Uninterrupted Service

ANACONDA Trolley Wire is made from Anaconda Copper 99.95% pure. A Single organization is responsible for the whole process of mining, smelting, rolling and drawing, thereby insuring the utmost in quality at every stage of production from Mine to Consumer.

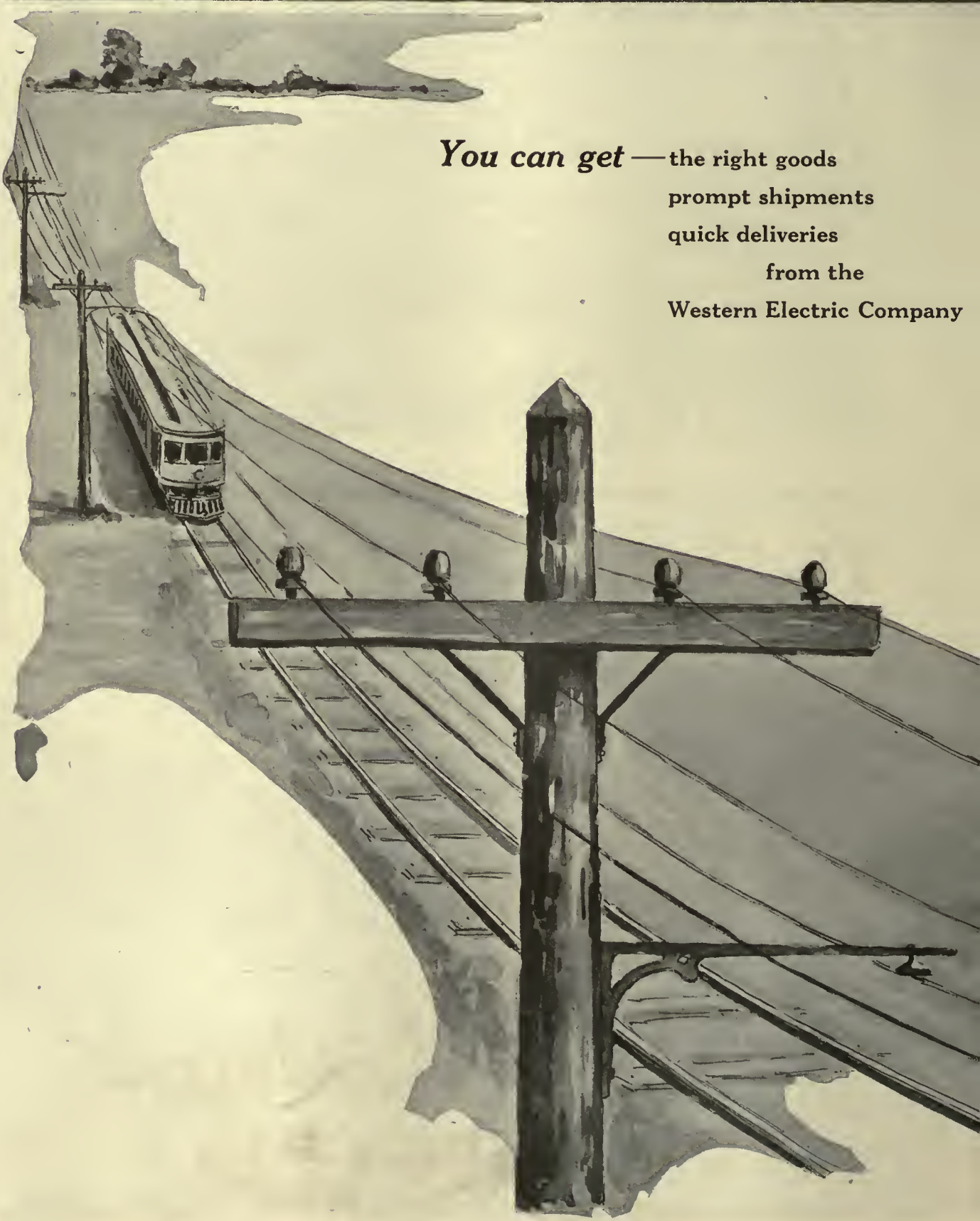
To insure uninterrupted service specify Anaconda Trolley Wire.

ANACONDA COPPER MINING CO.
Rolling Mills Department
CHICAGO, ILL.

THE AMERICAN BRASS COMPANY
General Offices
WATERBURY, CONN.

ANACONDA
TROLLEY WIRE

Western



You can get — **the right goods**
prompt shipments
quick deliveries
from the
Western Electric Company

Electric

Poles and Line Material

Everything electrical to construct and maintain your lines—that is what we offer. The list below names the high spots—each a product of an organization nationally known.

Everything you need is obtainable through the nearest of our 48 Houses. It is only a few miles or hours from you. These stocks save you time and money, for their nearness and completeness give you all the benefits inherent in large reserve stocks without the necessity of your carrying such stock financially.

Check the items you want and write for information

Poles
—Western Red Cedar
—Northern White Cedar
—Creosoted Yellow Pine

—and
—Wood Crossarms
—Boring and Pole Setting Machines
—Construction Tools
—Wood Pins
—Pierce Forged Steel Pins
—Brackets
—Braces
—Anchor Bolts
—Anchor Rods
—Log Screws
—Pole Steps
—Clamps

—Guys or Guy Wire
—Strain Insulators
—Cap and Cone Suspensions
—High Voltage Insulators
—Fibre Conduit
—Friction and Rubber Tapes
—Copper Trolley Wire
—Galvanized Iron Wire
—Trolley Ears
—Trolley Crossings
—Splicing Ears
—Section Insulators
—Rail Bonds

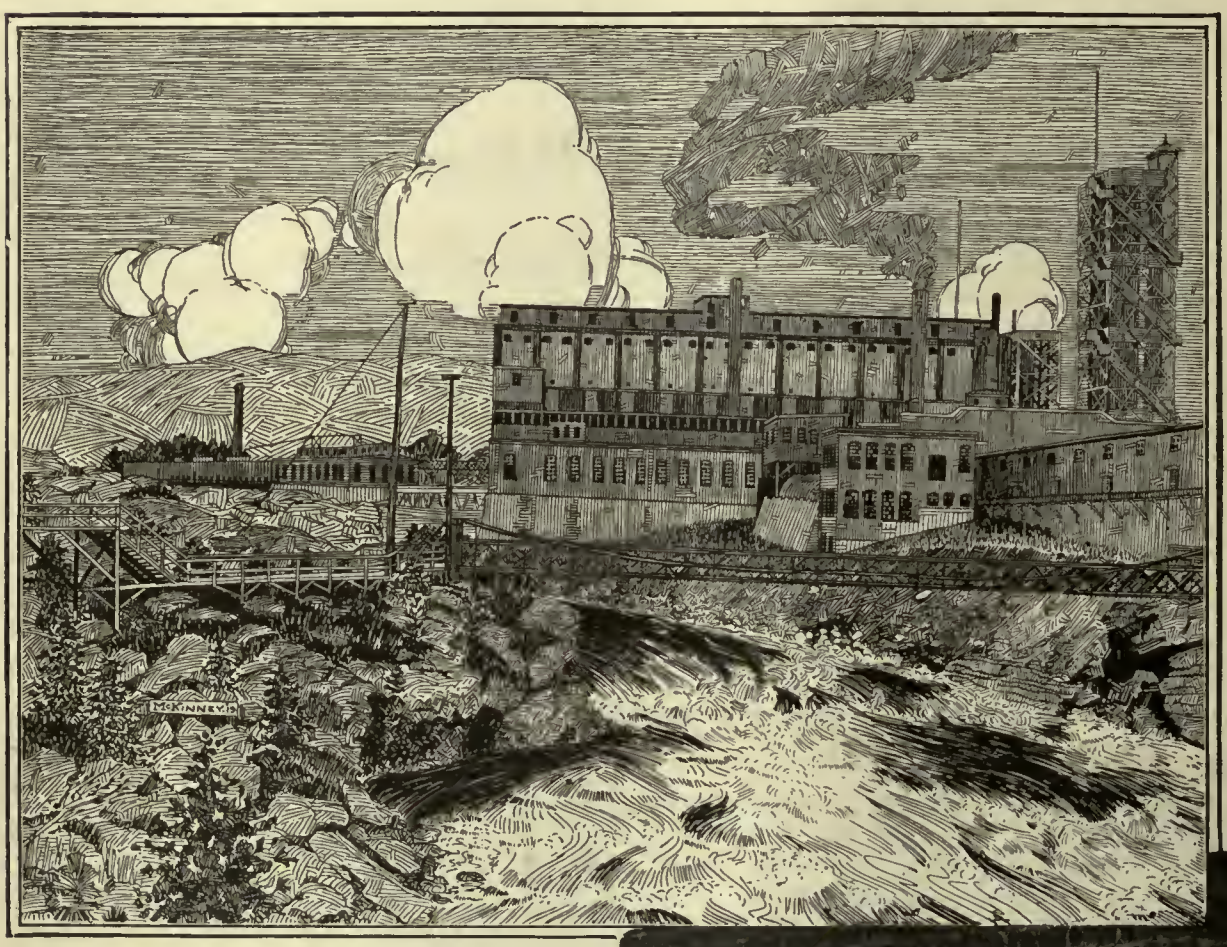
A NATIONAL ELECTRICAL SERVICE

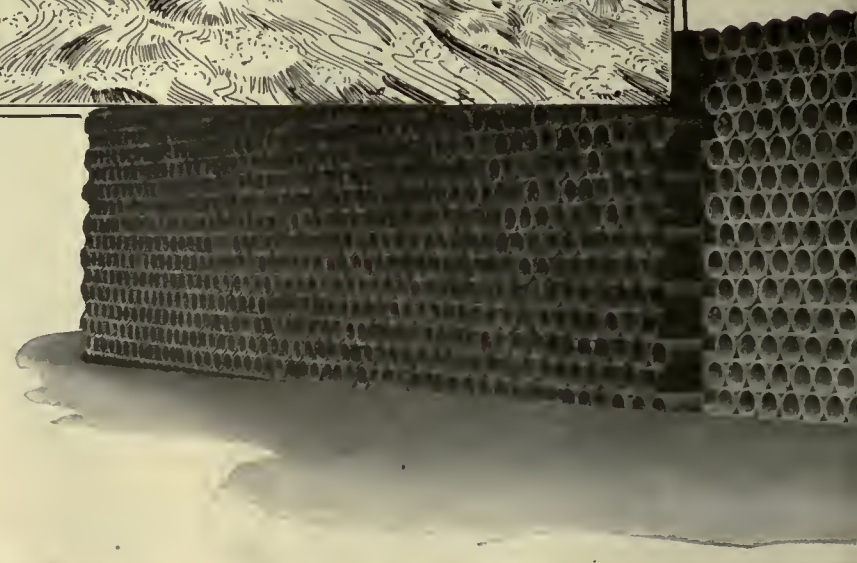
Western Electric Company

OFFICES IN ALL PRINCIPAL CITIES

ANNOUNCING A

Bermico Fibre Conduit and





BERMICO

—The trade name for the wood fibre products of The Brown Company which has served the wood pulp and paper trade since 1852.

Western

NEW ALLIANCE

Western Electric Distribution

A steadily increasing demand for a high grade long-lived fibre conduit to place more and more overhead lines underground and replace other forms of conduit already installed—

A manufacturer of national reputation seeking one established, efficient and economical distributing agency—

And—

A distributor measuring up to these qualifications seeking a source of supply capable of manufacturing and delivering in quantity and quality a product that will make possible an exceptional service to the trade—

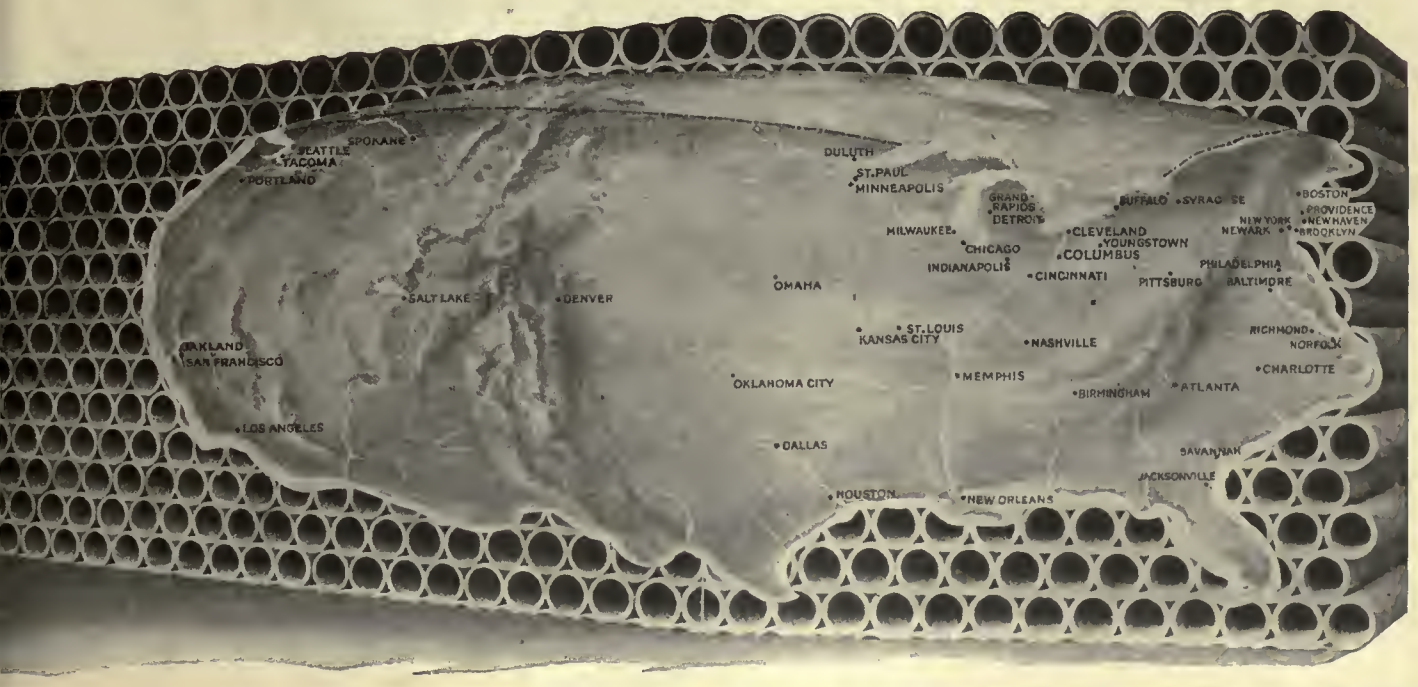
These three factors have led to the alliance of Bermico Fibre Conduit and Western Electric National Service.

This conduit was developed for the United States Government during the War. The pulp and fibre are produced under standardized conditions. Manufacture is under the supervision of expert chemists and engineers responsible for maintaining quality.

Bermico Fibre Conduit will be obtainable through any of our 48 houses. Stocks will be carried of straight lengths and bends in large variety.

Western Electric Company

Offices in All Principal Cities



Electric



Note the large area of contact made by the terminal of the Brazed Bonds.

Samples of Applied Terminals upon request.

Lasting conductivity

is the criterion by which to judge your bonding, for the conductivity of it measures your power return.

It must be the highest possible if you will use your electric power economically.

In addition to very high initial conductivity, your bonding must stay permanently so, without attention, for years of service. The upkeep must not continually eat into your profits.



Type ET Brazed Bond
Other types for the head or web of rail.

BRAZED BONDS

measure up to these very high standards.

The large area of the brazed union, the low resistance of the rail contact, together with the great mechanical strength of the braze, provide an unparalled, permanent conductivity.

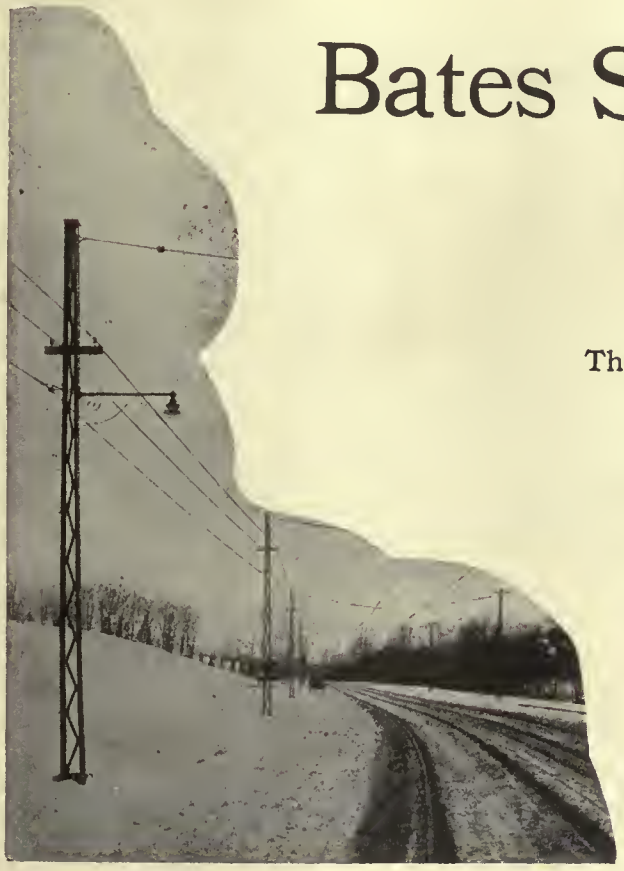
Our careful rolling or cabling of the copper conductors of our Brazed Bonds insure long life under the most trying conditions.

Write us for further details.

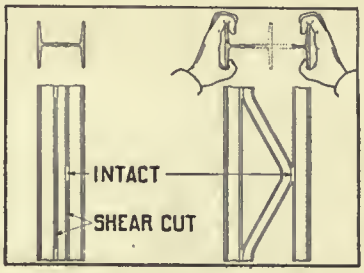
The Electric Railway Improvement Co.

Cleveland, Ohio

Bates Steel Poles



The Bates



Feature

The flanges of the sheared and heated H-section are gripped and pulled apart, thus stretching the web portion between the unsheared intacts of original steel, creating, without waste of material, a perfect one-piece Bates Expanded Steel Pole every two minutes from each Bates manufacturing unit.

There's a Bates Pole for every pole purpose

Bates Steel Poles are being used in rapidly increasing numbers in all types of modern construction all over the world. With their distinct advantages of strength, permanence, economy and their wide range of adaptability, Bates Poles have met the exacting demands of numerous pole users who are recognized as leaders in the electrical industry.

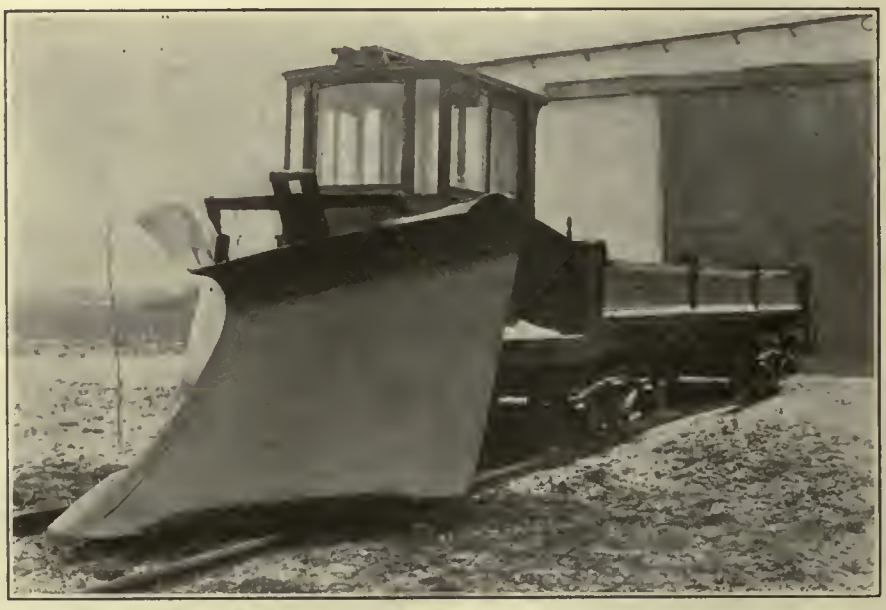
Bates Engineers will gladly co-operate with you in your planning

BEST

Bates Expanded Steel Truss Co.

208 South LaSalle Street, Chicago, U. S. A.

BATES ONE PIECE EXPANDED STEEL POLES



Differentials never stand idle. Differential quick demountable snow plow is just one more economical differential feature

USE

DIFFERENTIALS

for

Dump Cars
Electric Locomotives
Power House Cars
Snow Plows
Freight Cars

The Differential Steel Car Company

Findlay, Ohio



Easiest and most economical method of loading, unloading, and transporting ties.



Loading in tilted position. Greatly reduced height for hand loading.

MAINTENANCE

with DIFFERENTIALS MEANS ECONOMY in placing materials on the job, handling ties, loading and disposing of excavated material.

The Differential Steel Car Company

Findlay, Ohio



Unloading in congested section of large city. Material placed clear of track. No interference with traffic.

Read this ¶



and Save $

CHATHAM ELECTRIC ENGINEERING, INC.
ELECTRICAL CONTRACTORS
1956 BROADWAY
NEW YORK. May 15, 1922

Mr. H.B. Logan, President,
Dossert & Company,
242 West 41st Street,
New York City.

Dear Sir:

It may be of interest to you to know that we have used a number of Dossert Solderless Connectors in the cable construction work of the new Hell Gate Power Station.

We use Dossert Connectors in all our work for experience has proven that they not only make very efficient and neat appearing joints, but in practically every instance they save us money.

Very truly yours,
CHATHAM ELECTRIC ENGINEERING INC.
J. Wm. Ericksen
Chief Engineer.

—*with* DOSSERTS

IN EVERY power house, substation, shop, car and distribution system you'll find joints that DOSSERTS will do quicker and better than old methods.

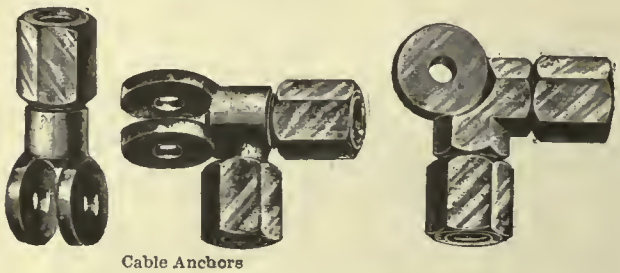
If you will figure up the year's costs for making taps, splices and connections on your system, you'll find that it represents a cost that you can cut materially if you follow the lead of a number of companies that keep a supply of DOSSERTS in the stock room.

A Dossert Catalog in the hands of your men will show them the kinds of connections that can be done so quickly with this Tapered Sleeve Principle of Solderless Connection.

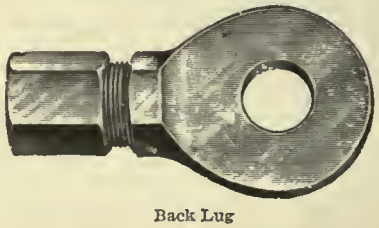
Write for a copy

DOSSERT & CO.,

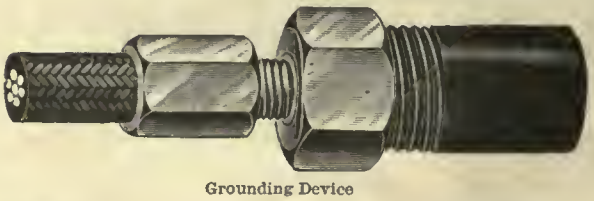
H. B. LOGAN, President
242 West 41st Street, New York



Cable Anchors



Back Lug



Grounding Device



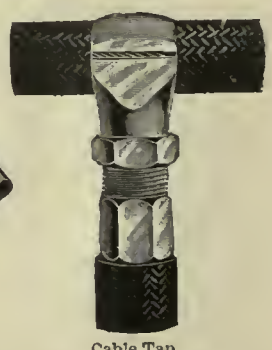
2-Way, Type A



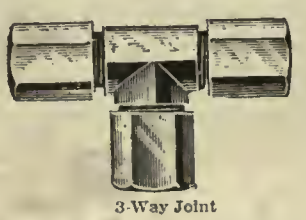
Elbow



Y-Joint



Cable Tap



3-Way Joint



Swivel Lug

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Found The World Over



The Ackley No-Staff Brake

Would Have Stopped That Car!

It is the ideal emergency brake because it is *quick-acting*. No time is spent in merely winding up slack. The action is practically instantaneous.

The hand wheel is 16 or 18 inch as you prefer.

Back up your air brakes with the NO-STAFF and be ready for any crisis from now on.

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Agencies throughout the World
Cable address "Acklebrake"

ACKLEY 24 RC BRAKE

Multiple-unit-control double truck passenger car for two-man operation.



CITY and interurban cars and trucks, safety cars, combination and work cars, snow plows, sweepers and electric locomotives.

Twenty years of specialization in the construction of all classes of rolling stock for the successful operation of electric railways.

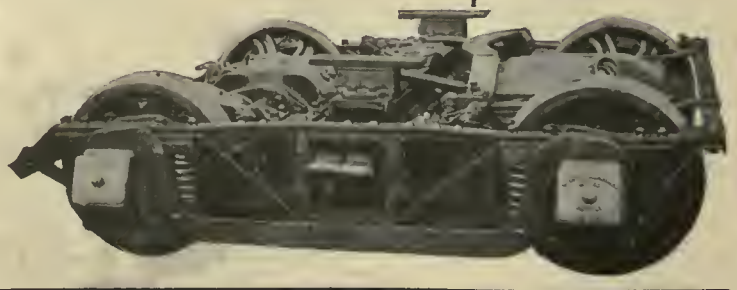
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Our Engineering Department is at your service whenever the question in new equipment comes up for discussion.

McGuire - Cummings No. 62 Motor Truck for low car body for city service.
Inside hung brake-equalizer design.



SHERMAN



The Vital Factor in Transportation

No wise man would consider erecting a plant without adequate foundations under it. Otherwise the investment in plant and in machinery would be jeopardized.

The most essential part of any industrial enterprise is the human structure of a working organization.

This is vitally true in transportation because 75% of railroading is human.

Your human structure must be made of the materials of human thought, feeling, skill, interest and loyalty—infinitely finer stuff than enters into your physical plant or property.

Many employers who own valuable plants and who view with pride their extensive properties have urgent need to rebuild their human structure, from the ground up.

Mutual understanding, cordial relationship, and sincere cooperation, laid deep in the minds and hearts of employee, insure the only permanent human foundation.

"The Viewpoint of the Employee Is the Mos Neglected Asset in Industry"

SHERMAN SERVICE INCORPORATED

Industrial Co-ordination *Production Engineertng*

John E. Sherman
President

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Write us on your business letterhead for copy of our monthly **Review of Industry** *of interest to all traction executives. Address Department DE*

THE LARGEST ORGANIZATION OF ITS KIND IN THE WORLD



No Panel except the most durable is suitable for railway service

The Denver Tramway Company writes: "We have used HASKELITE because of it

(1) *Light Weight*
(2) *Great Strength*
(3) *Attractive Appearance*
(4) *Low Cost of Installation"*

RAILWAY service demands the best. Roofs which leak and headlinings which sag are an avoidable expense.

HASKELITE is the most suitable for roofs and linings. It is the only panel which will pass the strict Grade A test specified by the Navy for water-resistant plywood.

HASKELITE roofs save time and labor; they are furnished moulded ready to apply and finish.

Linings of HASKELITE or PLYMETL are unexcelled for light weight, long life and attractive appearance. They will not sag or vibrate. They provide the best foundation for a lasting finish.

Among recent specifications are the following:

50 HASKELITE Roofs—Detroit Street Railways
25 HASKELITE Roofs—Eastern Massachusetts Railways
55 HASKELITE Linings—Pittsburgh Railways

The extreme durability of HASKELITE justifies the rigid adherence to its specification for roofs and linings.

Write for our blueprint booklet descriptive of HASKELITE and for samples of our 3/16 in. headlining—*the lightest weight headlining in use today.*

HASKELITE MFG. CORPORATION
133 W. Washington Street, Chicago, Ill.

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VULCABESTON

NOARK FUSES

DEPENDABLE PROTECTION

NOARK renewable fuses are approved by:

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A Worth While Saving

The Service of Marsh & McLennan Engineers results in a direct dollars and cents saving in insurance cost.

A large Eastern corporation, for example, was able to reduce its insurance cost from $17.50 per thousand to $4.30 per thousand, by carrying out the recommendations of our engineering service.

We will be glad to outline this service to business executives who are interested in reducing insurance cost.

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ELRECO

Combination Railway and Lighting

POLES



On the New Viaduct at Akron

Akron, Ohio is another one of those live middle-western cities which believe in *doing things* and doing them *right*.

Here's this two million dollar concrete viaduct, over half a mile long, which has been constructed as a real civic improvement. And on it they've used Elreco Combination Railway and Lighting Poles.

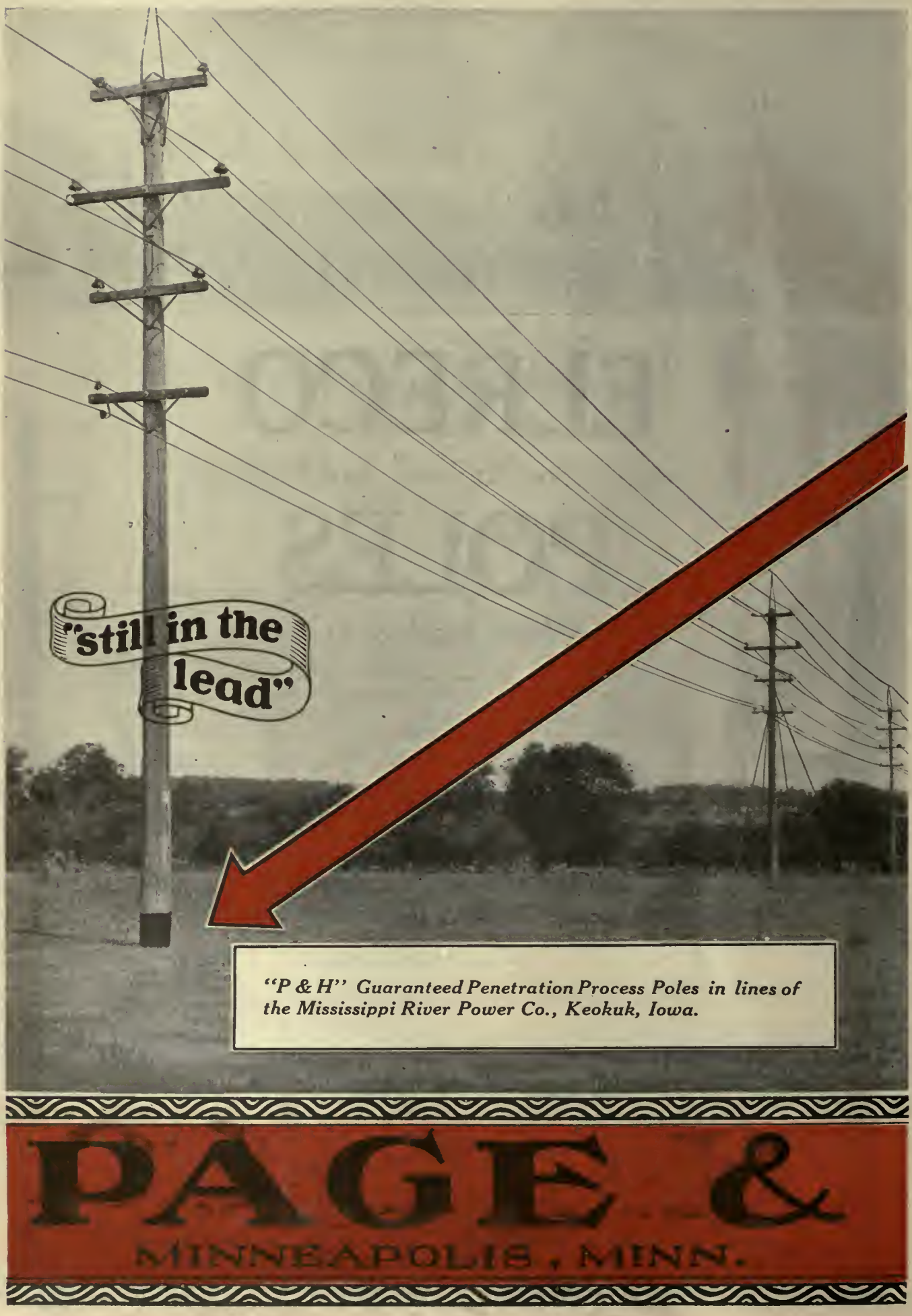
The advantages of Elreco Combination Poles are—fewer poles needed—beautified appearance of highway—lower maintenance costs. Any type of ornamental brackets and lamp fixtures can be attached as shown.

Write for illustrated catalogues

Electric Railway Equipment Co.
Cincinnati, Ohio
New York City: 30 Church Street






"still in the lead"
"P & H" Guaranteed Penetration Process Poles in lines of the Mississippi River Power Co., Keokuk, Iowa.
PAGE &
MINNEAPOLIS, MINN.

There is only ONE "P&H" Guaranteed Penetration Process

THE "P & H" Guaranteed Penetration Process is the **original** process of deep penetration Butt-Treatment. There is no other just like it. It guarantees, **in writing**, a full **one half inch** uniform penetration throughout the ground line area. We agree to refund the Butt-Treating price on any pole that does not show, by your own test, the full specified penetration.

It pays to buy "P&H" Guaranteed Penetration poles. They lower maintenance costs by reducing the replacements and giving longer pole life.

We produce and sell Butt-Treated and untreated Northern White and Western Red Cedar Poles;—we can give you any form of Butt-Treatment;—and we are the originators of the Guaranteed Penetration Process—the "P & H."

Prompt Shipment—yards conveniently located throughout the North Central and Western States.

Get the facts about Butt-Treatment
—write for illustrated folder.

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THE THERMOSTAT IN THE GLASS CASE

A Visible THERMOSTAT

A highly sensitive thermostat of the mercury thermometer type, efficient and reliable. Switches off the heating current at a predetermined point, automatically maintaining uniform temperature in the car.

Nothing new in that, you say. But—the CONSOLIDATED VISIBLE THERMOSTAT is

ENCLOSED IN GLASS

Sturdy, durable Pyrex glass that stands the shocks of service fully as well as the old type metal cover, yet keeps the thermometer tube always in view.



The CONSOLIDATED VISIBLE THERMOSTAT "Keeps Nothing Under Cover"

The thermostat controls the car heating system. The glass case gives a constant check on that control. The new Consolidated Visible Thermostat reveals the condition of the car heating system as easily and well as the water glass does that of the boiler.

Any attempt to damage the instrument, whether ignorantly or maliciously, is immediately apparent. This, as well as the glass tube itself, serves as a deterrent to the tamperer.

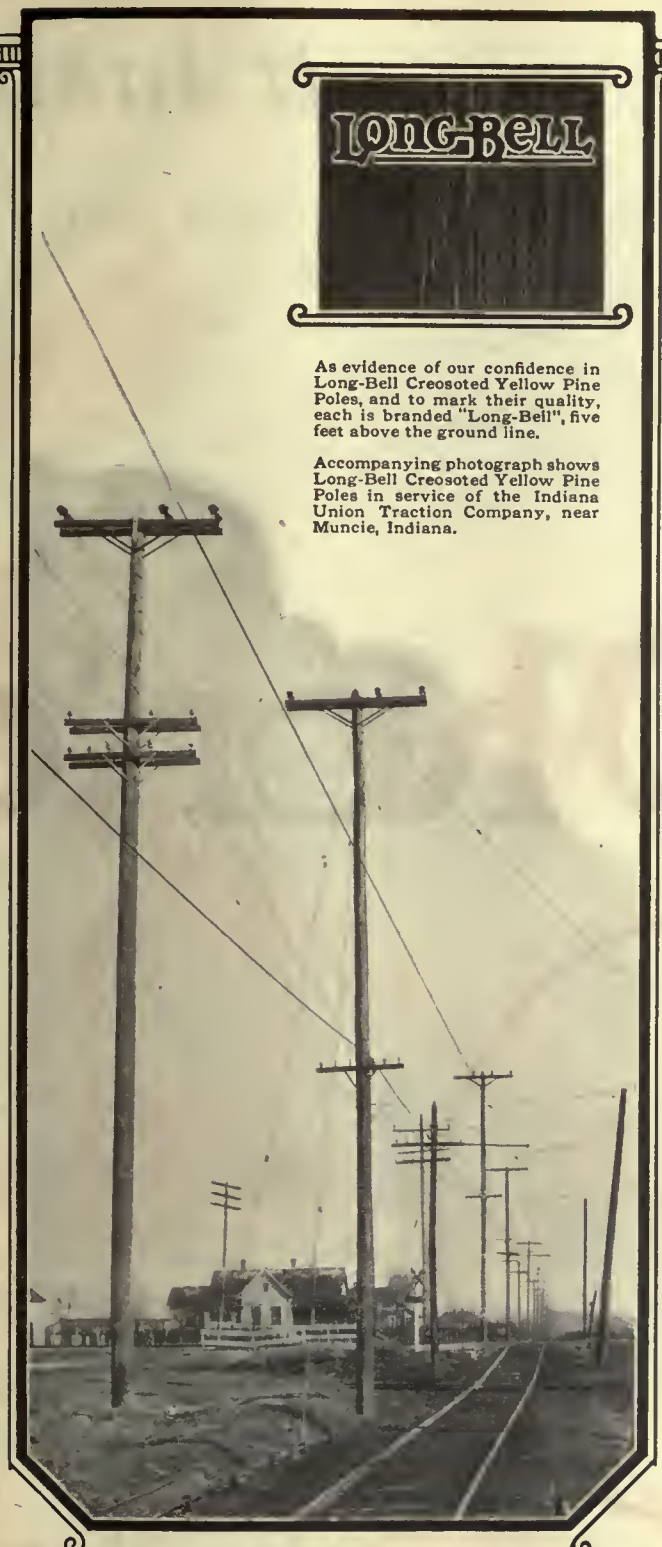
The CONSOLIDATED VISIBLE THERMOSTAT is unusually sensitive to temperature changes and correct in its action. It adds to the comfort of your patrons and reduces your heating cost. A new method of mounting the tube gives it stability and firmness, yet leaves it sufficiently resilient to absorb the shocks of street car service.

Write for Information or Sample for Inspection

CONSOLIDATED CAR-HEATING CO.

New York Albany, N. Y. Chicago

CONSOLIDATED CAR HEATING COMPANY



As evidence of our confidence in Long-Bell Creosoted Yellow Pine Poles, and to mark their quality, each is branded "Long-Bell", five feet above the ground line.

Accompanying photograph shows Long-Bell Creosoted Yellow Pine Poles in service of the Indiana Union Traction Company, near Muncie, Indiana.

OK!

BECAUSE of their great durability, Long-Bell Creosoted Yellow Pine Poles have the unqualified "OK" of many public service companies. Year after year tests show Long-Bell Poles as sturdy, strong and dependable as the day they were set.

Long-Bell Poles are treated, full length, with the best grade English Creosote Oil by the pressure-vacuum process. This makes permanent the unusual breaking, bending and shearing strength of Long Leaf Yellow Pine. They resist decay and fire.

In addition to efficiently serving their purpose, Long-Bell Poles are straight and attractive, giving a trim appearance to any right-of-way.

Get further information! Send for "Poles That Resist Decay", our booklet which fully describes Long-Bell Creosoted Yellow Pine Poles.

The Long-Bell Lumber Company

1235 R. A. Long Bldg. KANSAS CITY, MO.

Creosoted Yellow Pine Poles; Highway Guard Rails and Fence Posts; Timbers, Ties, Lumber, Piling and Wood Blocks.

LONG-BELL

Creosoted Yellow Pine Poles

—it lasted



A photograph of a section of the Phono-Electric wire which performed so steadfastly for the Denver and Interurban Railroad. The experience of this road with Phono-Electric wire is well worth considering in making YOUR choice.

Phono

Phono-Electric Phono-Electric

An enlarged cross section of the same wire showing the comparatively slight reduction by wear in relation to the period of time and the service rendered.



for fourteen years

(for the Denver & Interurban R.R.)

Recently the Denver and Interurban Railroad discontinued 3 miles of a line that had been in service for 14 years. The Phono-Electric trolley wire used on this line had undergone, during that time, 190,000 passes of the pantograph. The cross-section view shows how relatively little wear had resulted. In spite of the time and service this wire had rendered, there was no appreciable crystallization, for the wire was taken down, coiled on reels without the least difficulty and was almost immediately reinstalled on a new extension.

-Electric
TROLLEY WIRE

The sheer statement of such performance overshadows any comments or arguments that could be advanced without such conclusive proof. Examine the photograph and the cross-sectional drawing. It is evident that this Phono-Electric line is good for a great many more years of service. We like to offer this kind of evidence of the real economy of standardizing overhead construction with Phono-Electric.

MEMBER AMERICAN ELECTRIC RAILWAY ASSOCIATION AERA A E C T 1923

Bridgeport Brass Company
Bridgeport Connecticut

"Bridgeport" BRASS CO. TRADE MARK U.S.A.



Let users tell why they



Insert ploced between rail heads



Ramming self-luting mold box

SERVICE STRENGTH THERMIT WELDING ECONOMY

Washington Railway & Electric Co.

"Back in 1911 we installed 80 Thermit Joints. The joints bave given very satisfactory service. We are just starting about 500 more of these joints."

C. S. KIMBALL,
Engineer of Way and Structures.

SERVICE STRENGTH THERMIT WELDING ECONOMY

Indianapolis Street Railway Co.

"Our experience based on four years is very favorable and is proven by our increased orders for 1922."

From the office of the Chief Civil Engineer.

Metal & Thermit Corporation

order more Thermit Joints



Applying molds to rail



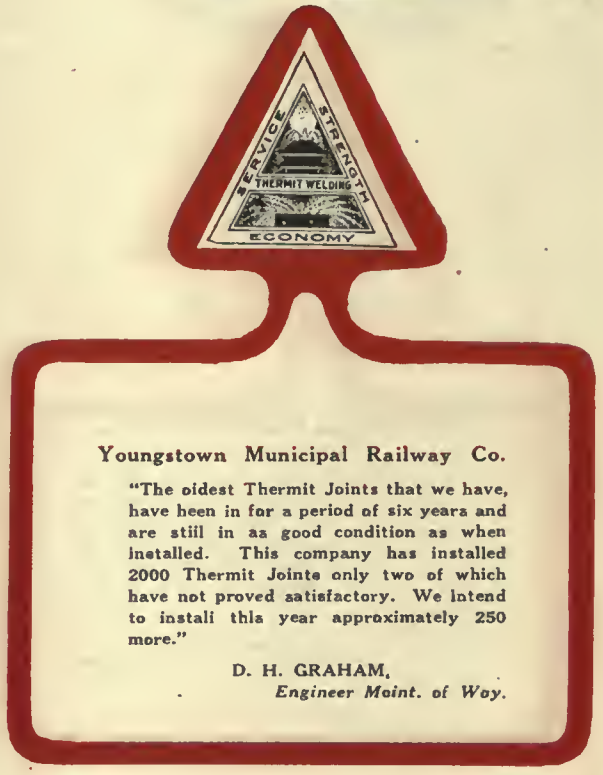
Preheating the rail ends



Chicago, North Shore, Milwaukee R.R.

"None of our Thermit Welds are over four years old and all of these welds are perfectly satisfactory. We are now installing *all* Thermit Welds in city track."

J. S. HYATT,
Engineer Maint. of Way.



Youngstown Municipal Railway Co.

"The oldest Thermit Joints that we have, have been in for a period of six years and are still in as good condition as when installed. This company has installed 2000 Thermit Joints only two of which have not proved satisfactory. We intend to install this year approximately 250 more."

D. H. GRAHAM,
Engineer Maint. of Way.

General Offices: 120 Broadway, New York

Pittsburgh Chicago Boston S. San Francisco Toronto

Others confirm the fact that



The Thermit reaction



Weld before grinding

SERVICE STRENGTH THERMIT WELDING ECONOMY

San Antonio Public Service Co.

"First cost is last cost, and first cost on approximately 40 miles of track has averaged about $8.00 per joint. We have no maintenance on this type of joint."

G. WALLACE SMITH,
Engineer.

SERVICE STRENGTH THERMIT WELDING ECONOMY

Houston Electric Co.

"The fact that no maintenance is required renders the Thermit Joint more economical in the long run."

P. S. DUENWEG,
Engineer Maint. of Way.

THERMIT

Metal & Thermit Corporation

"first cost is the last cost"



Thermit rail grinder grinding weld



Thermit weld after grinding

Chicago, Joliet Electric Ry. Co.

"Have given us excellent service. First cost is secondary."

The Milwaukee Electric Railway Co.

is using Thermit Welds for track joints. The oldest joints placed by that company are now ten years old and are showing excellent wearing qualities with low maintenance cost.

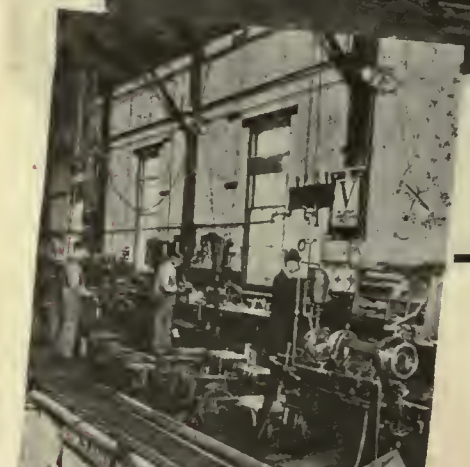
From the office of the Engineer of Way and Structures.

General Offices: 120 Broadway, New York

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——for rolling stock



——for car shops



——for power plants

"There is a tested Galena lubricant for every requirement of electric railways."

Galena-Signal Oil Company

New York Franklin, Pa. Chicago

and offices in principal cities



GALENA SERVICE

Reduces Lubrication Costs

When all factors are equated—miles per gallon, power consumption and wear and tear on bearings—and the actual net cost of lubrication is figured, Galena Service always shows surprising economies in maintenance costs. Over five hundred electric utility companies are now receiving the benefits of its efficiency.

Galena Service Engineers carry the authority of practical experience in the lubrication of every type of equipment. They bring to our clients the valuable knowledge acquired through many years of constant touch with lubrication problems of every nature, and co-operate with them in securing conditions that result in improved operation.

Correct lubrication means the use of the right lubricant in the right quantity in the right way. Its proper application means not only improved service but an ultimate economy in lubrication costs far beyond the purchase price of the oils used. Galena Service demonstrates, to your own satisfaction, that the supposed savings made in the purchase price of inferior oils are insignificant, compared with the expenses of repairs and depreciation arising from their use.

Let us figure with you now on operating your road the Galena way.

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Standard Helical Gears

7½° Helix Angle



Gear *Pinion*

Dotted line shows tooth-form 14½° involute. Solid line shows tooth-form of Nuttall Helicals.



Nuttall Silent Helical Gears are making wonderful records

They practically eliminate noise.

They minimize vibration and that means they lengthen the life of the entire equipment.

Wear is minimized to such a point that we predict mileages heretofore unheard of.

If they cost you three times as much as they do, they would still make big savings in upkeep and renewals.

Any road *not* using Silent Helical Gears should get acquainted with our trial proposition. You will want nothing else if you try just one set.

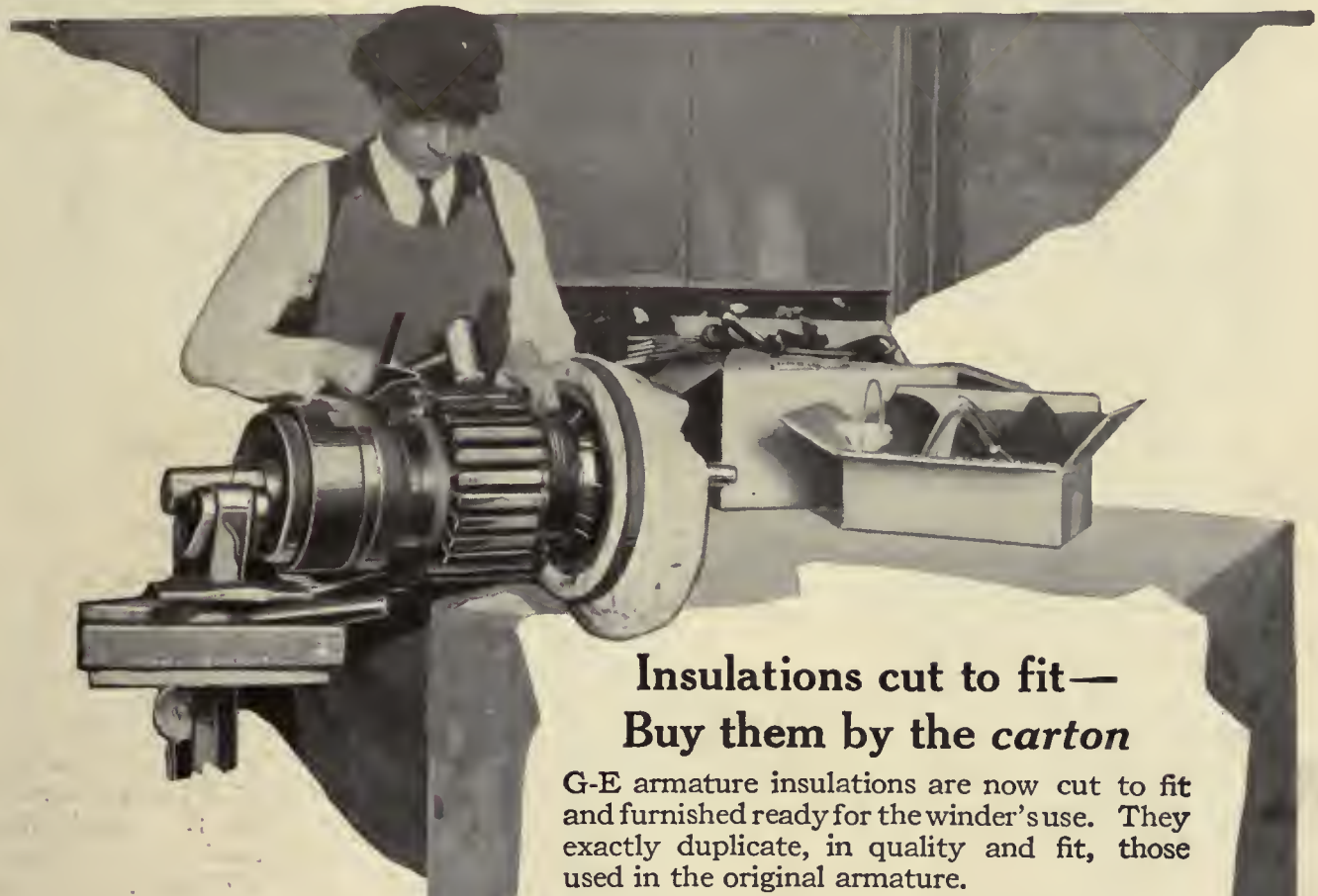
R.D. NUTTALL COMPANY
PITTSBURGH PENNSYLVANIA

All Westinghouse Electric and Mfg. Co. District Offices are Sales Representatives in the United States for the Nuttall Electric Railway and Mine Haulage Products.

In Canada: Lyman Tube & Supply Co., Ltd., Montreal and Toronto.

Nuttall

For higher standards in motor maintenance



Insulations cut to fit— Buy them by the *carton*

G-E armature insulations are now cut to fit and furnished ready for the winder's use. They exactly duplicate, in quality and fit, those used in the original armature.

These insulations are much more economical than bulk materials cut as needed. They are supplied in individual cartons—just enough to re-insulate a particular armature. There is no waste.

And G-E coils, a complete set for a G-E motor, are also packaged now—the last word in quality renewals for a dependable maintenance job.

Use your G-E Catalogs



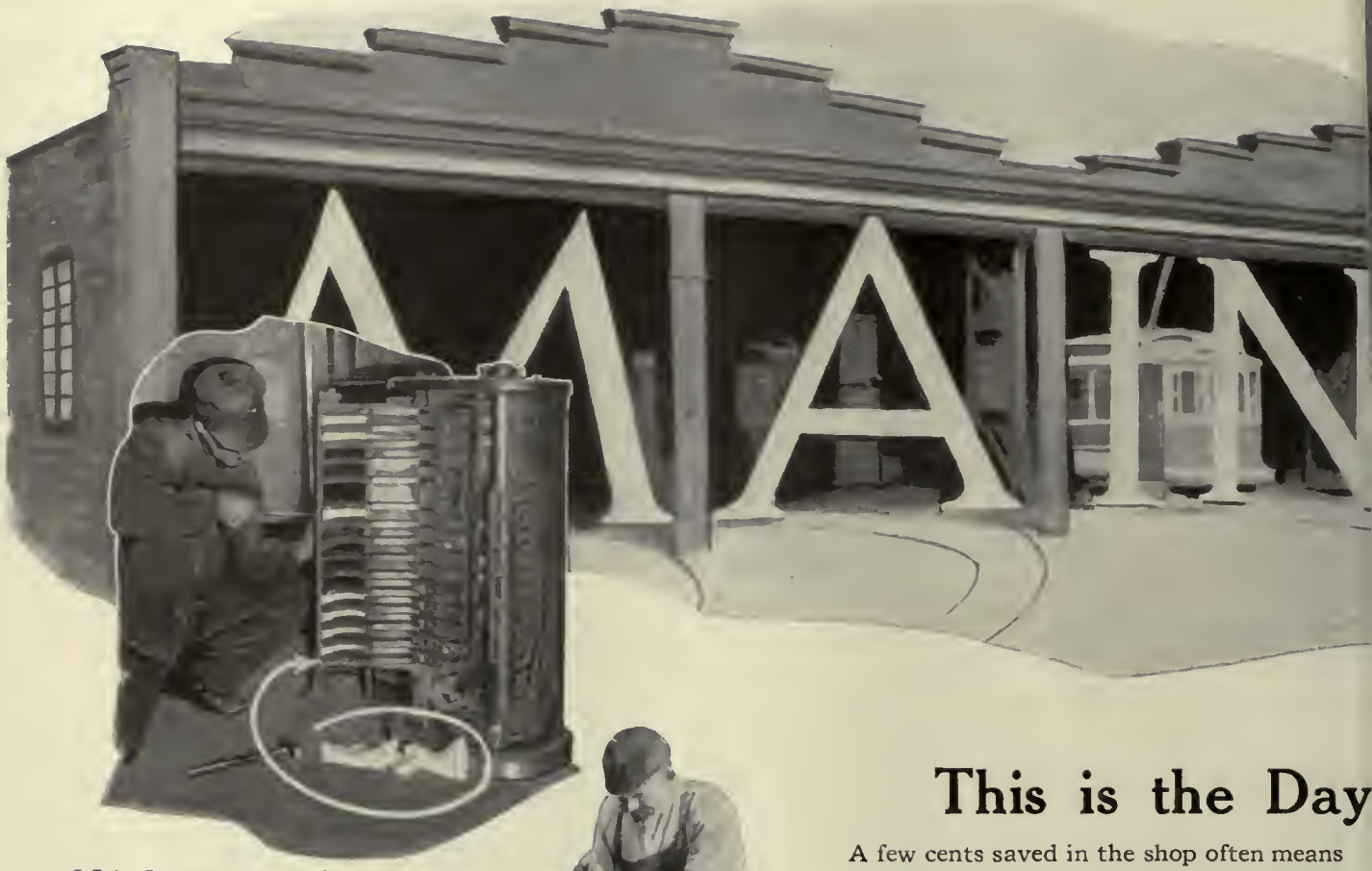
MEMBER AMERICAN ELECTRIC RAILWAY ASSOCIATION AERA

General Electric Company

General Office Schenectady, N.Y.

Sales Offices in all large cities

40-262



G-E Arc Suppressor Plates reduce burning of controller fingers, segments and orcing plates



Extreme care in manufacturing makes each G-E coil an exact duplicate of the next one

This is the Day

A few cents saved in the shop often means dollars on the road in lost revenue-miles. Many a poorly-made finger or segment is responsible for controller trouble; inferior motor coils burn out in weather emergencies and rush hours; ill-fitting brush-holders mean shorter brush and commutator life; and too often circuit breakers ruin the equipment they are installed to protect.

When it comes to renewals, only the maker of your G-E Equipment can make parts which exactly duplicate the originals. Could any other parts give better service?

Use your G-E Catalogs





MEMBER AERA

GENERAL



f Higher Standards

Maintenance of overhead with G-E Line Material is insurance against line-down tie-ups. There are hundreds of different devices, so every railway property's requirements can be met. They are built for harder service than you're likely to have for them—which accounts for their long life. Sturdy construction and that "G-E" protective finish is the reason—as any user can tell you.

When we compiled your G-E Railway Supply Catalog we made it easy for you to select these devices. Consult the section on Line Material before you start maintenance work this season.

Use Grade M—the "more-miles-per-dollar gearing"



G-E Line Breakers, mounted under the car, cut controller maintenance costs especially for companies with overloaded conditions



ELECTRIC

40-275

— and you can get prompt shipments



Use your G-E Catalogs



A nation-wide Warehouse Service

We don't urge you any more to stock up with large quantities of G-E Railway Supplies. Quite the contrary. G-E warehouse service has developed to a point where it insures that you can get what you want when you need it.

The General Electric Company maintains stocks of railway renewal parts and supplies in two dozen cities located all the way from San Francisco to New York. The fact that shipments from these complete stocks are made promptly enables you to let us do your stock keeping and thus reduce to an emergency basis your investment in supplies.

This is a G-E service you cannot afford to overlook. Take advantage of it. Use a G-E warehouse for your stock room, and simplify your stock-keeping.

General Electric Company

General Office Schenectady, N.Y.

Sales Offices in all large cities

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New York, Saturday, March 17, 1923

Electric Railway Journal

Consolidation of Street Railway Journal and Electric Railway Review
Published by McGraw-Hill Company, Inc.
HENRY W. BLAKE and HARRY L. BROWN, *Editors*

Volume 61 *Number* 11

Annual Maintenance Number

Opportunity Lies in Shouldering the New Responsibilities

NOW on the threshold of success, the electric railway industry faces the need for a reconsecration to its ideals and commitments. There has come a public understanding of transportation, which, if fostered, will redound to the welfare of the industry. But this public appreciation, now gained in part, challenges the industry to make good its acclaimed responsibilities and intentions.

Let the spirit of frank, fair, open dealing with the public continue wholeheartedly and even more completely and genuinely. Let the railways improve their service. They must spend money to rehabilitate, to modernize plant, methods and equipment. They must grasp every advance in the art to reduce the cost of service, and savings must benefit riders, employees and stockholders.

Employees must take a new hold of their jobs, cast aside the old idea of merely keeping the cars going with the least possible expenditure, and think of bettering operation. True economy now comes through new thinking, new tools, new methods, and the will to achieve a new standard of service.

The manufacturers, too, must accept new responsibilities. They have long been a great impetus in the development of the railways. Today, creative engineering thinking more than ever is needed, and the time has again arrived when it can be rewarded.

The public service commissions face a tremendous responsibility and a splendid opportunity. Their opportunity is truly to serve the best interests of the people. Their responsibility is to see that the utilities have fair treatment. Only when the electric railways are prosperous and healthy can the best interests of the people be served. Let commissions be above politics. Let the principle prevail that as a company serves, so shall it prosper.

Finally, ELECTRIC RAILWAY JOURNAL pledges its utmost effort in gathering and disseminating the best thinking and the best information for the aid of the railways, the manufacturers and the commissions. As friend, and as friendly critic, the JOURNAL will spare no labor or expense in helping the three other parts of the industry to carry on more intelligently, more effectively.

A Familiar Machine Used in a New Way

THE difficulty of teaching an old dog new tricks is proverbial. Every new method of performing a familiar operation is sure to meet with opposition from those who are used to the old way. But when it can be shown definitely that the new way is better than the old, then habit should not be allowed to block progress. The tests of the centrifugal separator for dehydrating transformer oil, described elsewhere in this number, seem to indicate that this method is superior to the filter press. A high dielectric value was restored in much less time than the old method required. Where these tests were made, it is the usual practice to take the transformer out of service during dehydration. Not every company can do that, however, and it may sometimes be a little dangerous to dump back into the top of a live transformer the first oil that passes through the separator. However, the filter press is not above criticism in this respect, when it is carelessly operated, and either apparatus can be so handled that the danger of a transformer breakdown is negligible. The fact that the centrifugal separator is already widely known as a purifier of lubricating oils may make easier its introduction as a machine for the dehydration of transformer oil. Its increasing use for that purpose is to be expected.

An Increased Use May Be Expected of Labor-Saving Machinery

WHETHER the present bill restricting immigration is responsible for the situation or not, labor, particularly common labor, is scarce, and the unemployment problem, so prominent two years ago, has disappeared. This means that increased attention must be given in all industrial work to developing the use of labor-saving machinery in every direction. This need was considered at the last meeting of the committee on procedure of the American Engineering Council, which recommended to that organization that it make an engineering study of industry for this purpose, particularly those kinds of work where great numbers of men could be replaced if power-driven devices did the work.

There is no doubt that labor-saving equipment is being used to a constantly greater extent in the electric railway field. The one-man car is an example in the transportation department, but the same condition holds true in all the other departments, shops, track and even in accounting.

In one respect an electric railway company is peculiarly well situated to introduce machinery of this kind, because it has conveniently at hand an inexhaustible supply of power, wherever power need be used. One need only compare the condition in track rehabilitation, for instance, with the steam railroad. Above the track, on an electric road, whether it is in a city paved street or in the country, is the trolley wire, from which power to any amount can be taken to drive concrete mixing and distributing machines, pneumatic tampers or riveters or any of the equipment needed in rehabilitating or renewing track. Even electric welding can be done directly at any point. Moreover, these machines not only work more cheaply and quickly than the unaided track gang, but the work usually is better; that is to say, the concrete is mixed more evenly and sets better because laid more promptly, the ballast is tamped more solidly, etc. Hence it is not surprising that there has been almost a revolution in track methods during the last few years, and it is perhaps along these lines that the greatest economies in an engineering way within the early future are to be expected in the industry.

Piece-Work Plan Tends to Induce Craftsmanship

NOW that labor conditions in the mechanical departments of electric railways are more nearly normal, it is not out of place to give attention to economies of a nature different from those which have been necessarily more prevalent. Among these is the piece-work system, which, when properly administered, cuts costs and improves the morale of the working force. This system owes its chief value to the fact that it is an approach to a man's being in business for himself, which means independence, interest in production and better workmanship.

The principal saving in piece work is the elimination of lost time. When a worker is paid for the time he puts in on a job, regardless of the work he does, there is almost sure to be lost time for there is not the clearly apparent incentive to make every minute count. This is likely to be true even if he is reasonably conscientious. To be sure, there are foremen on duty who are paid to see that men earn their money, but the foreman is neither omniscient nor omnipresent. No foreman can get men to do much more work than they do naturally under the day-wage system, and this is usually much less than they could easily do, and which they would enjoy doing, under the piece-work plan.

Also, when men are on piece work there is probably a greater incentive to the management to furnish them with the best machines for the work in hand. This follows because the system tends to make good machinery highly profitable. If the men are striving to get the most out of the machinery assigned to them, it requires obviously only ordinarily good perspicacity on the part of the management to see that poor machinery neutralizes part of the men's efforts and discourages them. To illustrate, suppose that in a routine operation a turret lathe could be utilized efficiently, with an output several times that possible with an ordinary lathe. Under these conditions the cost of the better machine would soon be earned by the increased output per man and per cubic foot of shop space. The contract prices for the output of the machine would be set at a fair value with due consideration of the facilities afforded.

The Interborough Rapid Transit Company, New York, as told elsewhere in this issue, has been very successful with the piece-work plan applied to a great many shop operations. With an experience dating back some fifteen years, the plan is on a basis that neither company nor men would abandon it. The Milwaukee Electric Railway & Light Company has also had conspicuous success with a similar plan, as shown in the ELECTRIC RAILWAY JOURNAL, issue of March 19, 1921, page 529, and issue of April 2, 1921, page 647. One very large company which was forced to abandon piece work for reasons beyond its control and against the sentiment of the men in the shop has since been confronted with shop costs about 50 per cent increased. This is another illustration of what the scheme means to a company in the way of lower costs.

Hence where the piece-work plan is practicable but not now in use it would be worth while to study the

maintenance work to see if some jobs could not be put on piece work. It is not necessary to have this on a large scale at first. Try it out on a few jobs.

Operating the Old Power Plant at Its Best

THIS is the year of checking up on everything. Because the system or any part of it has been operating with fair satisfaction is not always evidence that the best use is being made of it. Because the power plant may be old and really ought to be placed with a new one is not a very good reason for neglecting to get the best possible efficiency out of the present plant while it is continued in use. An illustration of what can be done in this direction is given in the article published this week dealing with the power plant of the Kansas City Railways. Rather than adopt a narrow policy of retrenchment, the management made a thorough study of all the factors bearing on high operating costs, and by complete revision of methods was able to eliminate more than half the labor charges and reduce the cost of power production some 35 per cent.

The salient feature of this example is that the changes did not involve any expenditures for extensive equipment, but only called for a more effective use for the existing plant. It would be interesting to see how much more could have been done had the superintendent been free to modernize the old plant as far as possible by providing such new auxiliary equipment and apparatus as steam flow meters, CO_2 recorders, new stokers and similar economizing apparatus in addition to the general checking up on waste practices.

There are many other electric railway systems which have power plants where savings of similar magnitude could be made if the problems were handled in the same thorough-going manner as was this one.

Looking Toward Standardization of Gear Blanks and Wheel Removal

ELECTRIC railways throughout the country are using a large assortment of special devices to assist in wheel removal work. A large number of these devices and the methods used are described in an article in this issue, written as the result of a survey of this work on fifty properties. It is evident from this that the problem of wheel removal is closely interlocked with that of gear design, since fully one-half the electric railways of the country make use of the web holes in the gears in connection with the pressing off of wheels.

Gear design has advanced considerably since electric railway operation first started. The need for small diameter gears with large hubs has decreased the space once used for spokes and later for web holes, until now some types are made entirely solid. Other types have very great differences in the diameter and spacing of the web holes. This has led to numerous complaints from the users and increased expense to the manufacturers in that frequently gears are rejected because the web holes do not correspond to those furnished on some previous order.

Some of the leading gear blank manufacturers have endeavored to build up a series of standards that will simplify conditions, and the American Gear Manufacturers' Association has also had a committee actively at work on this standardization problem for some time. It has been suggested that the proposed layout for web holes be submitted to the equipment committee of the American Electric Railway Engineering Association, and its co-operation asked toward some definite standardization. The subject of car gearing has already been assigned to the equipment committee for study and report this year, and it appears a very opportune time for all concerned to get together on this important subject.

From the information obtained in the JOURNAL'S survey it appears that standardization along the following lines will meet the needs of the majority of users. There should be four holes in the webs of gears spaced 90 deg. apart. The holes should be not less than 2½ in. in diameter. The diameter of the circle on which the holes are located must be governed by the hub diameters of the gear blanks, and a further detailed study of this one point will be necessary before it is possible to arrive at the several definite standards necessary.

In regard to standardization of wheel removal methods and appliances it is possible to draw these conclusions: Where both gear and wheel are removed at the same time, a space of ⅛ in. should be left between gear and wheel hubs to eliminate excessive starting pressures. Where the jack-pin method is used a device with the ends of the jack pins firmly anchored as in the stool type appliance is most satisfactory, and a collar should be used between the gear and the wheel. Of the devices for applying pressure to the wheels outside the gear, the split cylinder appears to have the most advantages.

Improved Appearance of Cars Is an Encouraging Sign of the Times

RECENTLY in a suburban community the people were not satisfied with their trolley service. Their chief objections were that the cars were dirty in appearance, inside and out, and that they were cold in winter, that the buzzer signal systems were too often out of order, and that the windows frequently stuck and could be neither opened nor closed. A committee was formed to wait upon the trolley company and present these complaints.

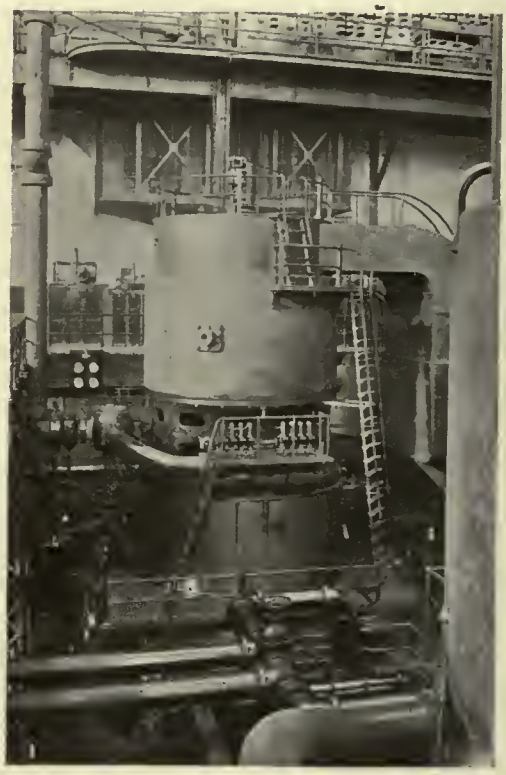
After receiving a polite greeting from an executive of the railway, the committee was led outside to where the cars were stored, and conducted down into the pits. It was explained to them that the trucks were of the latest pattern, and that the motors were new and powerful—in short, that the equipment was really of the best. The specific faults of which the people complained, the railway dismissed airily with the remark that they were all superficial. The committee was silenced but not convinced. In truth they were not particularly interested in trucks and motors and gears. But they were very much interested in nice looking, clean, warm cars, with buzzers that worked and windows that could be opened and closed. The trolley company, instead of trying to give the people what they wanted, tried to make them satisfied with what they had.

Such a policy is usually a mistake, for the public cannot be made to look at the question from the railway man's point of view. While it must be admitted that the upkeep of the running gear is more important than the upkeep of the car body, nevertheless appearance counts with the passenger. It is one of the most encouraging signs of the times to see again bright new paint on many cars everywhere, to discover heaters and buzzers in good order, and to find clean windows that slide easily.

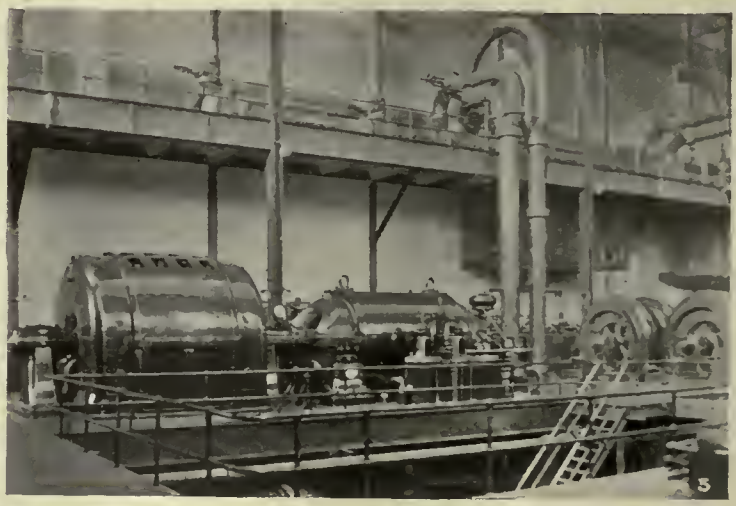
Missouri River Power Plant, Kansas City, Mo.

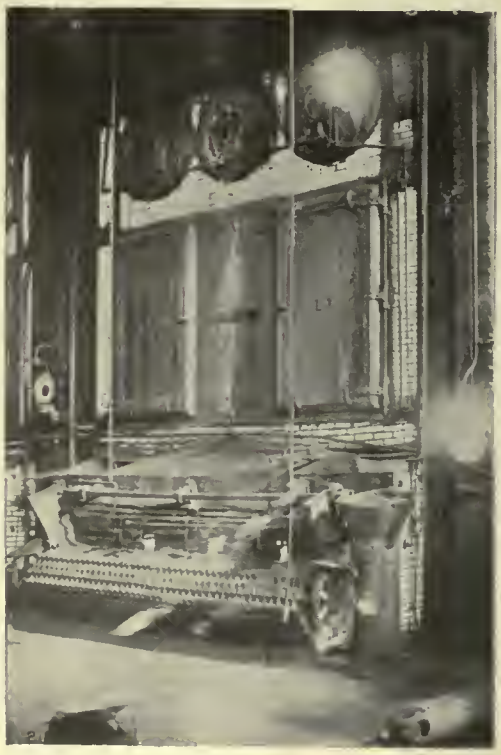
The existing equipment in the Kansas City Railways power plant was all installed prior to 1910. These views give an idea of the kind of station on which special maintenance attention has produced a high degree of economy











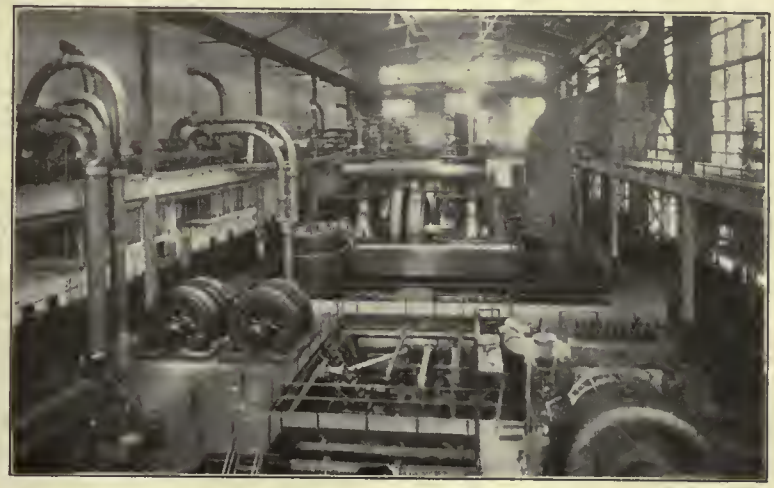


Power Generation Costs Reduced 35 per Cent

Elimination of Waste by Improvements in Practices in 50,000-Kw. Station of Kansas City Railways Has Resulted in a Saving of $1,000 a Day—This Has Been Accomplished by Methods Readily Available in Many Railway Power Plants

By D. E. Druen
Assistant Superintendent of Power, Kansas City (Mo.) Railways

RAPID advances in the design and operation of modern generating stations during the past few years, producing 45,000 to 60,000-kw. generating units and boilers of proportionate size operating under high pressures and temperatures, have tended to obscure the practices and ingenuity demanded of those operating older plants. While the new plants are equipped with all the recently developed facilities for obtaining maximum economy and for making their operation easy, the many antiquated plants scattered over the country still offer unrecognized possibilities of economies. It is not an exaggeration to say that by taking advantage of such latent economies operators working with old equipment may often reduce generating costs close to those of stations erected during the past ten years.



This General View of the Turbine Room Shows the Variety of Machines in Use

Such a problem was encountered in the Missouri River power plant of the Kansas City Railways. Though the work is not yet completed, the results accomplished to date have amply justified the efforts put forth. The Kansas City Railways passed into the hands of receivers in September, 1920. In line with reducing operating expenses of the property as a whole, an endeavor was made to effect economies in power generation. That the newly completed station of the Kansas City Power & Light Company had taken over practically all of the commercial load formerly supplied from the railway plant gave a further reason for every possible economy. While in 1920 the energy sales amounted to more than 40 per cent of the total output, in 1921 a drop to about 17 per cent was faced. This meant that besides the loss of the profit on the sales and a decreased total generation over which to distribute many of the operating charges, the plant would be operating at a load factor from 8 to 10 per cent lower. The decrease in the load gave the opportunity to overhaul equipment that in the past had been loaded to the limit to maintain service.

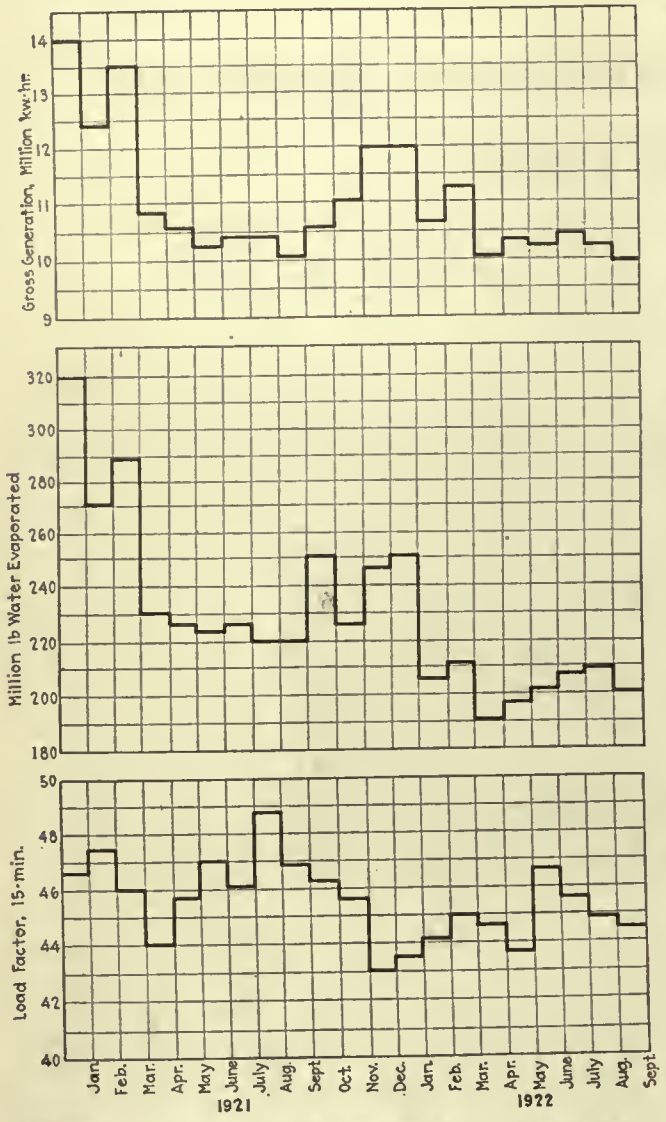
The station was built twenty years ago with an initial installation of three 3,000-kw. generators direct connected to vertical, compound engines taking steam from ten 575-hp. water-tube boilers. By 1910 the installation as it exists today was completed, the station having, in addition to the three original engine-driven units, which now are used only in emergencies, two 15,000-kw. vertical turbines and two 10,000-kw. horizontal turbines of later design. These four turbines are all equipped with old-type square condensers having tubes 1¼ and 1½ in. in diameter, arranged in solid nests. With condensers of this type a rapid falling off of the vacuum accompanies an increase in the circulating water temperature and a considerable depression of the hotwell temperature during the winter months. The circulating water, which is drawn from the Missouri River, carries a considerable amount of silt in suspension. Its temperature ranges from 33 deg. F. in the winter to 84 deg. F. during the hot summer months. Under these circumstances and the best conditions of loading, it is possible to obtain from the turbines water rates ranging from 14.8 to 15.8 lb. per kilowatt-hour.

The boiler room contains forty water-tube boilers arranged on two floors, one directly above the other. Two rows of ten boilers each face a common firing aisle. Twelve boilers on the first floor are fitted with old-style underfeed stokers and the remaining eight are equipped with natural-draft chain grates. On the upper deck nine more boilers also have chain grates, while the stokers have been removed from the other eleven and oil burners installed. All the boilers still have the original headroom of 8 ft. from the floor to the bottom of the front tube header, giving a furnace volume of 6.6 cu.ft. per square foot of grate area for the underfeed stokers and 3.4 cu.ft. for the chain grates. Steam is generated at 185 lb. pressure with 85 deg. of superheat.

In 1921, on account of the various fields from which fuel was procured, coal showed only a balanced average heat value of 9,574 B.t.u. per pound. The average analysis of the coal as fired was as follows:

Fixed carbon	44.2 per cent
Volatile	25.1 per cent
Ash	18.8 per cent
Moisture	11.9 per cent

In 1920 the average calorific value of the fuel used was 9,670 B.t.u. per pound; last year it ran about 9,460.



Reduction in Load and Load Factor Which the Operating Force Had to Face

Coal is spouted from an 8,000-ton concrete storage bunker above the second deck of boilers to hand-propelled lorries serving the boilers. Ashes from the upper deck are spouted to the ash hoppers of the lower deck boilers located in the basement. From there they are hauled by means of a 2½-ton gasoline mine locomotive to a skip hoist at one end of the plant that raises the ashes to an overhead spouting device delivering them to standard railroad cars.

This brief description of the plant furnishes a general idea of the equipment in the station as it exists today and as it was on Jan. 1, 1921, when steps were first taken to reduce production costs. What savings have been obtained were effected with the addition of no new apparatus except a master steam gage, three boiler feed pump regulators and a centrifugal oil purifier, all representing an investment of perhaps $2,500.

It is difficult to figure accurately what savings have been brought about as a result of the general house cleaning and the adoption of an organized program of operation based on an analytical study of conditions in the Missouri River plant. Had 1920 operating costs, when the plant was running under more favorable conditions as regards load factor, total generation and quality of coal, been applied to 1921 conditions of load, it is estimated that the cost would have exceeded the actual amount spent by $275,000. In a like manner the year 1922 shows a saving of $450,000, making a total saving in twenty-four months of about $725,000, or an average of about $1,000 per day. Such a comparison seems conservative when it is considered that the price of coal for both years was practically the same and it was of lower B.t.u. content in 1921 than in 1920, that the load factor was from 8 to 10 per cent lower and the annual output about 31 per cent less. Coal has been slightly cheaper in 1922 than in 1920, but the average load factor was not quite as good as in the previous year and the total generation ran a little behind that of 1921.

Actual cost figures show that the average energy cost per car-mile for 1921 was reduced 1 cent under 1920 and another ½ cent during 1922. In all this period the energy consumption per car-mile was practically constant. The reductions cited are the difference between almost steady conditions obtaining in 1920 and a period when costs are continuously falling, so that the ultimate saving will not be reached until the station has been operated at the new economical level for some time.

During 1921 the coal required per kilowatt-hour was reduced on the average about 0.52 lb. as compared with 1920, and a further reduction of 0.68 lb. was effected in 1922. The actual consumption is now running 1.2 lb. per kilowatt-hour below the average of two years ago. The B.t.u. per kilowatt-hour is now about 12,000 less than two years ago, which represents about 1.1 lb. of coal. The increased economy meant a real saving of around 38,000 tons of coal in 1921 and about 68,000 tons in 1922, or a total of 106,000 tons in twenty-four months. Coupled with this are savings in every other phase of plant operation, so that we have been producing in 1922 a kilowatt-hour on the average at a reduction of 35 per cent compared with 1920 costs. The lowest figure reached so far was in December, 1922, when the cost per unit was 47 per cent under the average for 1920.

The accompanying curves show the tendency with the new operating practices for the thermal efficiency to go up and for costs to drop. Certain limits of efficiency of the station are imposed by the existing equipment. It is estimated that without the addition of more economical units the best economy with present operation will be reached by the end of this year. That the entire plant organization is directing its efforts to this end is indicated by operating costs in January, 1923, which were lower than any in 1922.

Continuity First Essential

When the new régime took charge of the plant at the beginning of 1921, it was apparent that a radical departure from practices in vogue would have to be made without delay. The initial efforts were directed toward insuring continuity of service. The station had suffered fifty-two service interruptions in 1920, varying from a few minutes to two hours, making the solution of this difficulty imperative. A careful analysis, supplemented by information gathered from the station operators, revealed most of the sources of trouble. The immediate elimination of the faults responsible involved hasty repairs to auxiliary equipment, the overhauling and adjusting of machine governors, oil switches, disconnects, control wiring, feed lines, boiler feed pumps, etc. Rigid rules for the regular inspection of every unit were laid down, and operating methods were adopted that not only would minimize the possibility of service interruptions but would also permit the reestablishment of service with the least delay. Every

cause of breakdown was sought out and eliminated or provision made to lessen the hazard. As a net result of these efforts the station has had but three interruptions since Jan. 1, 1921. The maximum tie-up, of about nineteen minutes, was due to an error in switching and not to failure of any apparatus. This record shows the benefit derived from making deferred repairs and enforcing rigid operating rules.

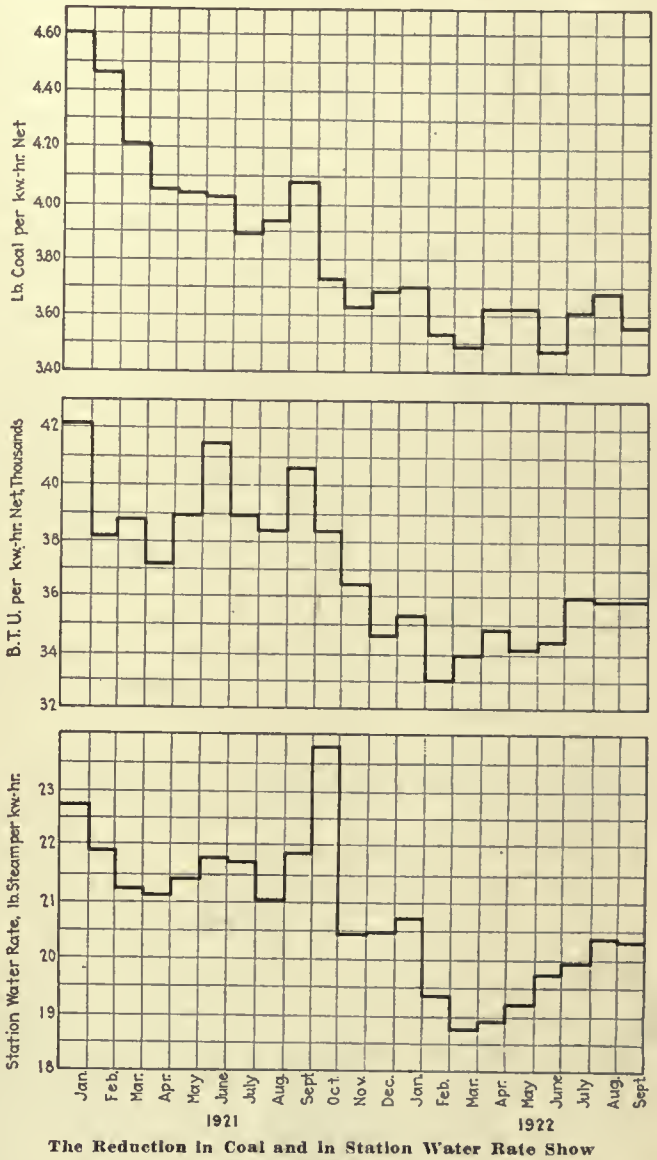
Building an Organization

The building up of an efficient and capable operating organization has been a most interesting and fruitful phase of the work. It would have been comparatively easy to form a group capable of operating the plant at the existing economy and do nothing but improve the service reliability. But in addition it was necessary to bring the thermal efficiency of the station to the maximum possible with the available equipment, while maintenance on the building and equipment that had been deferred for years had to be completed, and radically different operating methods had to be adopted. Old traditions and customs that had become law had to be wiped out. In fact, it was first thought the most feasible plan would be to replace the major portion of the station employees. But among them were many old and loyal men worthy of every chance and assistance, so that this plan was abandoned and instead it was decided to build the new organization, if possible, from those already employed. The result is that the present employees were nearly all in service during 1920.

In December, 1920, 360 men were regularly employed in the station. It was estimated that 170 men should be sufficient, so that a weeding-out process began in January, 1921. Among the old employees quite a few were physically unfit for central station work, and they were the first to go. In many instances it was found unnecessary to fill their places, but when one of these men had to be replaced a man was picked from another crew. The next step was to eliminate the undesirables. We felt that no organization could function properly with men in its ranks who had a tendency to promote dissatisfaction in any way. One of the most difficult things we had to do was to develop an entirely new attitude in the minds of the men, as they had become listless and absolutely disinterested in the success of the plant. Having little or no knowledge of operating costs, they accepted service interruptions and equipment failures as a mere incident in the day's work.

Another line of investigation was carried out to determine easier and better methods of doing work and of increasing the output per man, enabling us to get rid of the non-essential workers. This third reduction in forces was reflected on the weekly payroll curve during March, 1921. Following this, further improvement in operating methods and a careful study of the characteristics of individual employees showed that some were incapable of adapting themselves to the changed conditions, and they were weeded out. From that time on, no employees were dismissed before they were critically studied. These studies revealed that in some instances men had held positions for years and yet they were capable of other work in the station that would make them more desirable and valuable employees. The rate at which these changes in organization were made and the effect of force reductions is indicated on the accompanying graph.

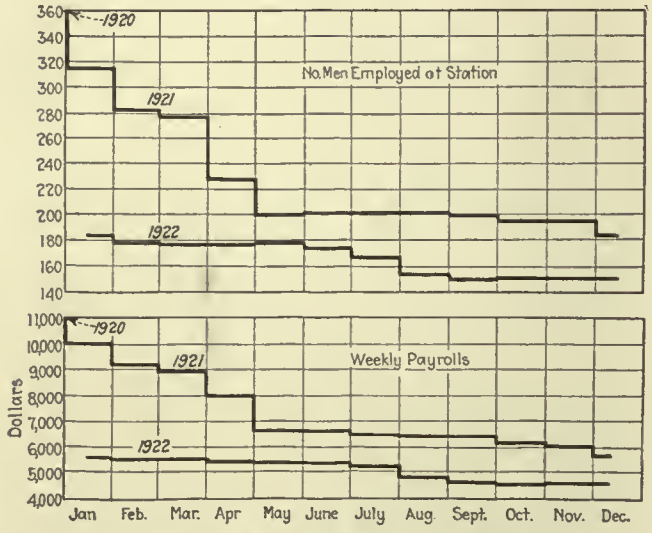
At the end of twenty-four months of this organization building we find that 150 men now comprise our entire



The Reduction in Coal and in Station Water Rate Show the Progress Made

station force as compared to 360 in 1920. This force of 150 men has completed deferred maintenance on building and equipment and made it possible for the station to render practically 100 per cent service at a unit cost for power in December, 1922, of 47 per cent less than the average for 1920. Probably the one greatest factor that made it possible to accomplish this was the changing of the attitude of these men from the defensive to the offensive.

We have endeavored to produce an organization that would operate as one large family with the common incentive of ever decreasing the cost of producing a kilowatt-hour. Today one would look far to find as contented and efficient a power plant organization as that operating the Missouri River power house. A visitor will find that almost any one in the station, from the chief engineer down, can tell him the exact number of pounds of coal per kilowatt-hour required last month and the month previous. Only through such organization has it been possible to accomplish what has been done during the past twenty-four months, as it must be remembered that this group was gleaned entirely from the force found in the plant at the beginning of 1921. A power plant committee, composed of five representatives chosen from the workmen and five from the engineers and foremen, with the plant superintendent as chairman, handles all matters pertaining to



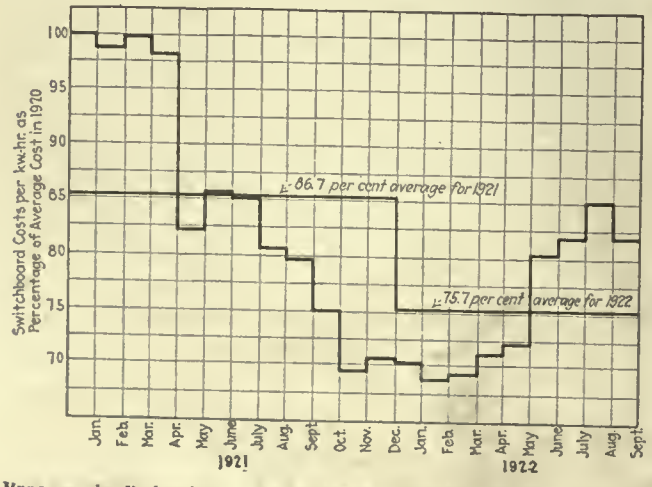
Reduction in the Number of Men and Corresponding Change in Payroll Were Made While Obtaining Better Operation

wages and working conditions, welfare and safety. This committee meets twice a month.

While the work of building up the personnel and the physical condition of the plant was under way, progress was being made in improving the thermal efficiency of the station. As every operator knows, the greatest possibilities for increasing economy of a given installation exist in the boiler room. On the basis of a series of boiler tests on the losses in warming up and banking of the boilers and on their efficiency at various loads, a method of boiler dispatching has been established which reduces banked boiler-hours to a minimum and allows the boilers to be operated at a maximum boiler efficiency.

These tests showed that it was not economical to force the boilers to a rating much above 150 per cent because of the limited combustion space, and there are enough boilers so that it is seldom necessary to exceed this rating. Formerly the boilers had been operated at 180 to 200 per cent of rating, with considerable drop in the efficiency. At these higher ratings, gas passages and furnace volumes were too small, and consequently when operating at ratings much over 150 per cent, furnace and stoker maintenance reached an abnormal figure, ashpit losses were large and considerable trouble was experienced with slag on the boiler tubes.

Four of the forty boilers have been arranged for service by an independent feed pump and heater, so that all make-up water may be passed through them.



Progress in Reduction of Switchboard Costs Shows the Combined Result of All Changes

All scale deposits are thereby localized and scale-free water is fed to the remaining boilers. The make-up water drawn from the city mains averages from sixteen to twenty grains of hardness and is treated with soda ash to neutralize as nearly as possible the scale-forming tendency. We are just beginning to realize the benefits of this scheme and expect to make a material saving in fuel by it in a short time. A sand filter for the blow-off water has produced a substantial saving by conserving scale-free water. The city water bill has been reduced from an average of $1,800 a month to $850, and by using the generator air washers to reduce the temperature of cooling oil and jacket cooling water, we anticipate reducing the city water bill in 1923 to approximately $400 per month.

The adoption of the various methods described has raised the average boiler efficiency from 59 to 67 per cent. Four oil-burning boilers are being revamped to give more efficient combustion for use over the peak loads, thereby reducing the banked hours on the coal-fired boilers. All fuel and ash are analyzed, the ash analyses being grouped by the boilers fired by different men. The tabulated results are posted in the boiler room so that every man knows what he is doing.

Generator dispatching has been worked out on a B.t.u. input-output basis, and economies from this source are already apparent. The most economical unit carries the base load, and the other units are put on the line for the additional load in the order of their water rates. As the load may be predicted a day in advance, the probable load curve is drawn to the correct time plotted for connecting and disconnecting machines from the line. On the same sheet a similar curve is drawn indicating the number of boilers and the time for them to be put on and off the line. On the day following, a bulletin is posted commenting on the previous day's operation.

Each morning all data covering the previous day's operation are figured and plotted. The curves, which are carried out for a complete month, are posted each morning with the figures of the day before. These sheets show the gross generation, boiler horsepower-hours in service, total evaporation, station water rate, individual machine water rates, combined machine water rate, plant load factor, machine load factors, average barometer, temperature of circulating water, individual machine vacuums, water evaporated per boiler horsepower-hour, average kilowatt-hours per boiler horsepower-hour, and total evaporation. Each month a comparative report is prepared showing the station efficiencies. It is circulated throughout the plant and compared by the men with previous months.

Further Economies Contemplated

To reach our desired goal we have several plans which do not involve the purchase of additional equipment. We contemplate obtaining a better balance by bleeding two turbines to the heater through thermostatic control valves. Steam "laning" in the condensers is planned by the removal of tubes. Thus steam can reach the lower tubes directly without cooling the steam already condensed. From this change we expect a slight increase in vacuum and also a decrease in the depression of the hot-well temperature.

It is also planned to install an evaporator for handling the make-up feed water, and also assist in maintaining the proper heat balance.

A lubrication survey completed last September indicated that the cost of lubrication may be reduced about

50 per cent. Progress made thus far indicates that the contemplated figure undoubtedly will be reached. In this survey each piece of station equipment that required lubrication was given a page in a lubrication handbook on which was noted the equipment number, manufacturer, speed, kinds of lubrication required, times of lubricating, the recommendation for oil and quantities, lubricator attachments, etc. Thus the proper oils for the lubrication of the unit and the approximate quantity required per 100 hours of operation were determined. On the generating units with circulating oil systems, oil levels were set and the oil maintained at this level. On the fifteenth and first of each month, a sample is drawn from the oiling system of each turbine and examined in the laboratory for the determination of acidity, saponification, viscosity, emulsification, dirt, etc. The test results and the average maximum bearing temperatures are plotted on curve sheets, one for each generating unit. Piping from each turbine oiling system has been arranged to bypass the oil to a centrifugal oil purifier which is also arranged to purify miscellaneous oil reclaimed from auxiliaries.

A similar analysis is now being made covering all packings used in the station. The grade and size required for any particular location will be determined and mandrels will be provided for cutting the packing to exact size. Already we have standardized valves for all types of service from 2½-in. sizes to the smallest in use. By studying the necessary amount of maintenance supplies, the stores stock has been reduced by about two-thirds.

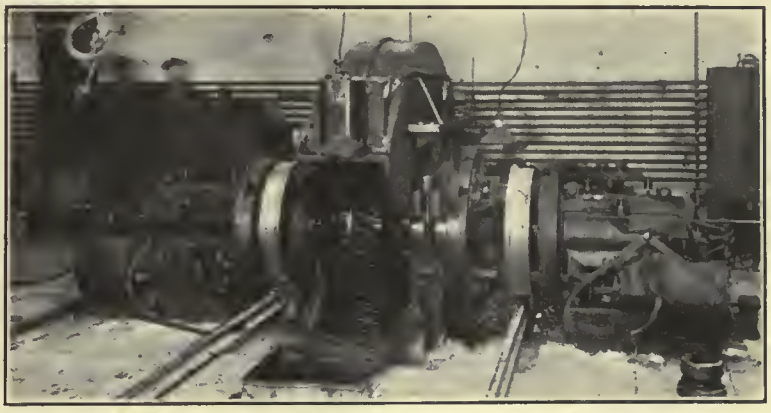
The above are but a few of many schemes we are working on to assist in obtaining the lowest possible production costs from the station.

While the results as shown might have been accomplished in less than two years, the reorganization of the plant forces involved much more than a reassembling of men under different lines of authority. A sudden radical departure from methods in vogue for years would not only have upset the organization, but would have defeated the very ends we wished to attain. Today we have a competent, willing and confident working unit, whose efficiency has made possible all the savings so far, and which ultimately will obtain every available economy within the station's possibilities.

Piece-Work System in Car Maintenance

Interborough Rapid Transit Company, in New York City, Has Secured Excellent Results from Its Use on Routine Jobs—Men Make More, and Company Saves Money—Men Take Great Pride in Developing Special Skill

THE piece-work plan of payment of workmen is highly developed in the manufacturing field and has been used to a limited extent on electric railway properties. A pioneer in this field was the Interborough Rapid Transit Company, which for fifteen years, more or less, has used the plan on all shop operations which are sufficiently standardized to render this possible. As early as 1912 the system was producing satisfactory results so that the management was willing to have its working described in the ELECTRIC RAILWAY JOURNAL, which was done in the issue for April 6, 1912, page 576. Since that time there have been minor adjustments in detail, but the fundamental principles which governed then are followed today. These principles are, in brief, as follows:



This Powerful Lathe Illustrates the Types of Machines Which Have Helped Make Piece Work a Success on the Interborough

First, in general it is to the interest of both workers and employer to get the maximum output from the maintenance plant, to the extent to which the work does not overtax the men.

Second, the men are more contented with, and interested in, their work when assured that they will be compensated for their own efforts. This results in a constant endeavor to eliminate lost time.

Third, while the company pays the men more under this plan, its return is greater both as to direct cost per unit produced and in economy in the use of shop space and facilities.

Fourth, the system tends to the development of specialists, who realize that by doing their work better than others could do it they insure steady work for themselves, as well as better remuneration.

The men who are on piece work like it, and there is a constant incentive to day workers to get on piece work when they can. Further, the industriousness of the piece workers sets a good example to the force generally.

THE PIECE-WORK PLAN IN PRACTICE

An example of the good results of the piece-work plan is furnished by the operation of wheel turning. The men on this job have studied it so carefully that they are now putting a pair of wheels through in twenty-two minutes on the average, at a contract cost of 34.1 cents. Under the plan of paying for work by the day the output in this operation was three or four pairs of wheels per day per man. With the improved machinery now used, with high-speed tool steel and with operation at 100 per cent efficiency due to the use of the piece-work plan, the output has been increased to



Looking at the End of the Big Wheel Lathe Which Turns Wheel Treads and Flanges in Twenty-two Minutes

twenty-five pairs of wheels per day per man, and the men are able to earn on the job about $200 per month. This has been made possible by the elimination of lost motion, and the forcing of the cut to the maximum of efficiency.

The piece-work plan is used not only on routine operations but on new installation work as well. This work is kept separate from the maintenance work, and the regular force is not employed upon it.

One of the most interesting jobs of recent years is one now under way, the equipping of nearly four hundred cars, now in use, with high-voltage, multiple-unit car-door control. This involves considerably more than 150 contract items, large and small. For example, one contract calls for the cutting, threading and reaming of about 600 pieces of electric conduit and air pipe (for one car), for which the contract price is $16.10; another calls for the bending of these pipes to template, at $11.60, etc.

To make this illustration somewhat more tangible the following excerpts from the schedule are given:

Disconnect brake rigging for jacking car bodies, disconnect and remove air piping and conduit for installation of multiple-unit door equipment. Remove fitting from pipe and deliver to stock room. Motor car, per car A. W. I. (All work included)	$9.50
Same, trail car	2.40
Drill holes under car body for installation of air and conduit pipe clamps. Motor car, per car, A. W. I.	9.60
Same, trail car	5.00
Cut to length and pull in all wires for multiple-unit equipment, excluding pulling from master controllers to cutout switches and door contact shoes to reversing springs and switches. Motor car, per car, A. W. I.	37.00
Same, trail car	32.00
Dismantle vestibule light cluster on high-voltage trail cars, per car, A. W. I.	0.20
Install vestibule light cluster on high-voltage trail cars, per car, A. W. I.	0.35
Install the following apparatus in motor-car body interior: two door-lock cylinders, two cylinder relay boxes, two interlock boxes, two car-door unit cutout switch boxes, one electric brake resistance coil and one governor resistance coil with necessary bolts and brackets. Motor car, per car, A. W. I.	3.00
Rethread and plug thirty holes in back of door. Motor car, per car, A. W. I.	1.80
Install door-engine bedplates: Spot ten rivet heads with drill and remove seat separators, clean floor, set up drilling jig, drill four ¾-in. holes and bolt bedplate in place. Install door engines as follows: remove magnet valves and engine levers, install door slide rods and brackets, drill two ¾-in. holes, line up machine, bolt in place, connect and adjust so that door operates free. Motor car, per car, A. W. I.	15.00

TIME STUDIES ARE CONSTANTLY BEING MADE

The aim of the equipment department is to have as many jobs as possible on piece work. To that end a constant study is made of all day work with a view to changing it over. The detail of this falls to the "data collectors," one to each department, who are expected to report on all possibilities, with facts to back up their recommendations. They not only do this but also suggest changes in the procedure on an operation when, in their opinion, it is not being done to the best advantage.

The machine shops, paint shops, wood mills and blacksmith shops are practically all on a piece-work basis. All types of bearings are babbitted, brush-holders overhauled, commutators removed and replaced, and armatures stripped, rewound and banded on the same basis.

Take, for a detailed example of the way in which a routine job is put through, the treatment of a car which comes into the paint shop for repainting. The foreman has a complete list of the items which may

INTERBOROUGH RAPID TRANSIT COMPANY

PAINT DEPARTMENT OPERATION SHEET

Manhattan Division

Car No.												
Date In												
Date Out												
Cost												
Work	Contract No.	Price	Amount	Pass and Date	Amount	Pass and Date	Amount	Pass and Date	Amount	Pass and Date	Amount	Pass and Date

Fig. 1—Check Sheet Used for Preventing Duplication of Charges

possibly require attention, although usually a car does not need to have everything done to it that is included in the list. The following are the items and contract prices on Manhattan Elevated cars, which have wood bodies and have been in service for many years:

Scrub exterior	$3.02	Paint seats	$0.73
Prime exterior	1.26	Varnish seats	.642
Putty and sand, oil enamel	.321	Paint motor truck	.389
Second coat exterior	1.90	Paint trailer truck	.282
Number ends exterior	.0243	Putty and sand reinforced cars, having panels	.788
Number ends interior	.0243	One coat color	.282
Letter boards	1.57	Putty and sand reinforced cars, having sheathing	.428
Door posts, burn off	.0603	One coat color reinforced sheathing	.272
Paint deck	.389	Remove paint and varnish	.96
Paint canvas roof	.428	Sand body sash	.428
Paint gates	1.20	Paint heater wires	.073
Black off ironwork	1.26	Scrape body sash	.86
Door posts, putty and plaster	.122	Paint new canvas roof	.321
Scrub motor car interior	1.81	Truck shoe beam	.122
Scrub trailer interior	1.43	Seat frames	.37
Clean and oil curtains	.48	Clean motor truck	.341
Clean hand straps	.389	Clean motor car trailer truck	.525
Putty and paint lining	1.11	Clean trailer truck	.428
Enamel head and side linings	1.35	Spray motor truck	.171
Sand and varnish motor interior	2.22	Spray trailer truck	.122
Sand and varnish trailer interior	1.81	Safety gate	.073
Number glass, 1 fig	.418	Paint heaters	.321
Number glass, 2 figs	.515	Scrub floor strips	.96
Number glass, 3 figs	.60	Paint floor	.219
Number glass, 4 figs	.681	Remove varnish trailer	12.24
Warning notice seats	.564	Remove varnish motor	15.01
Scrape and clean sash	.0243	Remove varnish, sand strips, etc.	2.77
Body sash burn off	.0243	Remove varnish, sand parting strip	3.55
Body sash scrub two sides	.0122	Varnish trailer	3.16
Body sash scrub one side	.00603	Varnish motor	4.34
Clean embossed glass	1.18	Body sash	.049
Sash to loft	.108	Varnish sash stops, etc.	1.90
Body sash, finish one side	.049	Window capping	1.43
Body sash, finish both sides	.073	Remove varnish in part	.788
Cleaning glass	1.35	Remove varnish swing door	.321
Blinds, scrub two sides	.0122	Bleach, etc., in part	1.26
Blinds, prime and enamel	.0185	Paint steel posts	1.59
Scrub seats	.63		

In a case like this it is sometimes possible to group some of the jobs, in which case the group is given a combination number and is priced at the sum of the component contract prices.

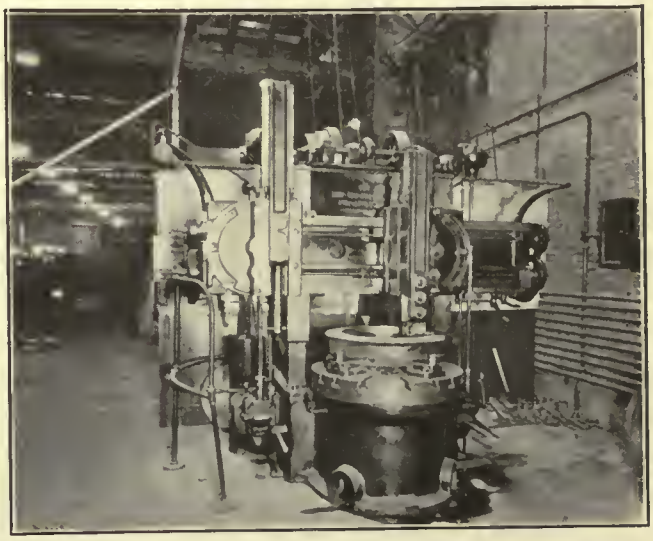
In the operation of the piece-work system everything depends upon the proper determination of the contract prices. These are set in the Interborough shops on the basis of careful and detailed time studies. By the term "detailed" is meant the actual measurement of the time of each component part of an operation. When a special construction job develops, such as the equipping of the large number of cars with door control already mentioned, sample cars are equipped by careful workmen and time studies are made as the work proceeds.

In routine operations a man is selected for test who is average as far as production is concerned. He knows that the time studies are being made. A large number of timings are made, say seventy-five or more, and maximum, minimum and average values are noted.

Then comes the task of fixing the rates. In doing this allowance is made for odds and ends of things that must be done during working hours and also for a reasonable amount of speeding up under the stimulus of the piece-work plan. This work is done in great detail and, once done, the contract prices are not disturbed unless conditions change or the job is modified.

As an example of the making up of a price, take a small piece like the wood base-block for a car-door cutout snap switch. This is a piece which requires a finish all over, rounding of the corners, slotting underneath and a little shaping on the bandsaw machine.

First, a study is made of the time required to get the several machines ready for use. For this the workman



This Boring Mill Is a Valuable Unit in the Interborough Piece-Work Scheme

is allowed 81 cents, regardless of the number of pieces ordered. He is then allowed 3.913 cents per piece, which is the sum of the following items, each of which has been made the subject of careful time study:

A—Cross cut to over length	0.015	cent
B—Rip to over width	0.03	cent
C—Joint to give true edge	0.054	cent
D—Re-rip	0.02	cent
E—Dress to thickness	0.047	cent
F—Square and cross cut	0.135	cent
G—Cut slot, single cut	0.092	cent
H—Band saw to shape	1.1	cents
I—Bore four $\frac{5}{32}$-in. holes, six $\frac{1}{32}$-in. holes, jig work	1.45	cents
J—Round off all edges	0.97	cent
Total	3.913	cents

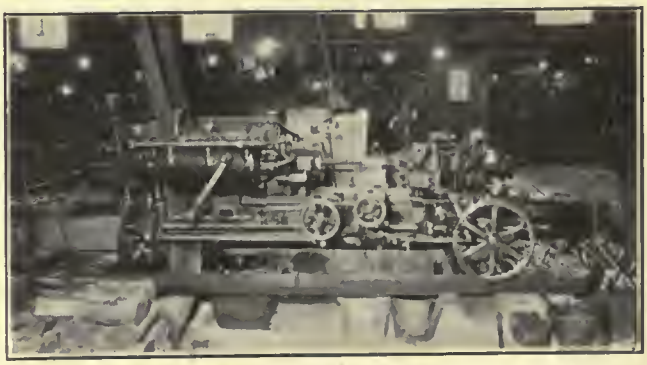
Thus on an order of 200 base blocks the workman would get

$$81 + (200 \times 3.913) = \$8.636, \text{ or}$$

4.318 cents each, whereas if he made but ten pieces the price would be 12.013 cents each. This, of course, illustrates the importance of getting out large quantities on each order.

The advantage of having a detailed analysis like this lies not only in the accuracy of it, but it renders very easy the changing of the contract price without new studies if one or more of the parts of the operation are omitted. Of course, if the job is expanded the new items must be priced from additional time-study data.

In keeping track of the work of each man, and of the group or gang engaged upon a given job, the daily form shown in Figs. 2 and 3 is used. Fig. 2 shows the

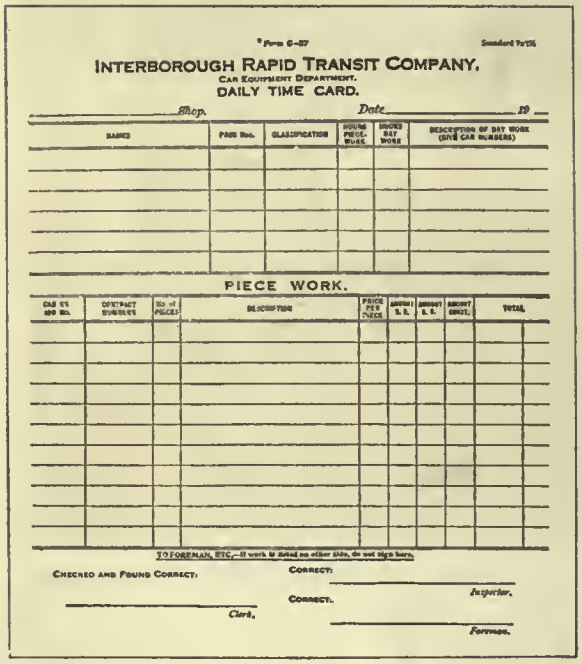


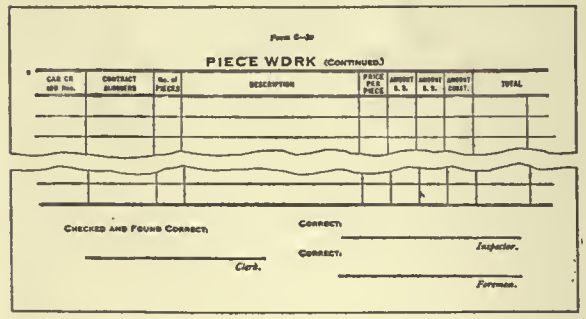
This Turret Lathe Turns Out Bolts at an Amazing Rate

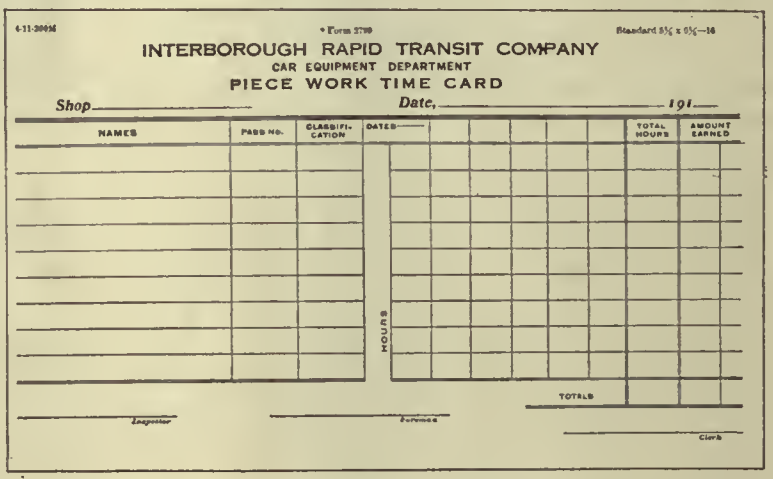
face of the sheet, which is 7x8 in. in size; while Fig. 3 shows the back, used in case extra space is required.

This form comprises two sections, one for a general summary of each man's work for the day, the other for a detailed statement of the work done by the gang as a whole on each contract. It will be noted that the work is detailed by contract numbers, every job of piece work being so identified. The particular job is noted also, or if it is a routine job on a car the car number serves as identification. The number of pieces, nature of the job, price per piece and amounts charged to slight repairs (S. R.), general repairs (G. R.) and construction are also given.

This slip is signed by the inspector or checker and the foreman or his clerk, these having agreed that the work was properly done and in the quantity stated. The inspector and foreman co-operate for the purpose of insuring compliance of the work with specifications as to quality, and the inspector for this purpose is assistant to the foreman. He, however, is responsible to the head of the piece-work department.


INTERBOROUGH RAPID TRANSIT COMPANY.
CAR EQUIPMENT DEPARTMENT.
DAILY TIME CARD.
Shop. Date 19
NAMES | PASS No. | CLASSIFICATION | HOURS PIECE WORK | HOURS DAY WORK | DESCRIPTION OF DAY WORK (GIVE CAR NUMBERS)
PIECE WORK.
CAR NO. AND No. | CONTRACT NUMBERS | No. of PIECES | DESCRIPTION | PRICE PER PIECE | AMOUNT S. R. | AMOUNT G. R. | AMOUNT CONST. | TOTAL
TO FOREMAN, ETC.—If work is listed on other side, do not sign here.
CHECKED AND FOUND CORRECT: Clerk.
CORRECT: Inspector.
CORRECT: Foreman.


Form C-2r
PIECE WORK (CONTINUED)
CAR NO. AND No. | CONTRACT NUMBERS | No. of PIECES | DESCRIPTION | PRICE PER PIECE | AMOUNT S. R. | AMOUNT G. R. | AMOUNT CONST. | TOTAL
CHECKED AND FOUND CORRECT: Clerk.
CORRECT: Inspector.
CORRECT: Foreman.


INTERBOROUGH RAPID TRANSIT COMPANY
CAR EQUIPMENT DEPARTMENT
PIECE WORK TIME CARD
Shop. Date, 191
NAMES | PASS No. | CLASSIFICATION | DATES | TOTAL HOURS | AMOUNT EARNED
HOURS
TOTALS
Inspector. Foreman. Clerk.

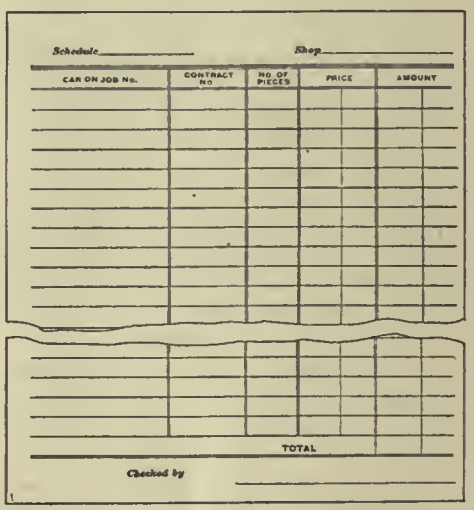

Schedule. Shop.
CAR OR JOB No. | CONTRACT NO. | NO. OF PIECES | PRICE | AMOUNT
TOTAL
Checked by

Fig. 2 (Above, Left)—Front of Daily Time Sheet Used on Piece Work, Interborough Rapid Transit Company

Fig. 3 (Below, Left)—Back of Daily Time Sheet

Fig. 4 (Above, Right)—Front of Weekly Piece-Work Time Card

Fig. 5 (Below, Right)—Back of Weekly Time Card (Printed lengthwise)

Each week there is compiled also the piece-work time card for each gang, summarizing the information on the daily slips. This form is 5½x9½ in. in size. It is shown in Figs. 4 and 5. This form on its face calls for the total hours worked by each man and the amount he earned. On the back is a summary of the work done by the gang, the costs being segregated by contract numbers.

A third form (blueprinted) which is found useful is known as the "check sheet." This is shown in Fig. 1. Its main purpose is to prevent duplication. On this sheet, of which there must be one copy for each major job such as repainting, as covered in the list on page 445, the work is itemized in a column for each car. Then as work on an item is reported for a car it is entered at the appropriate point, furnishing a check against a second charge for a given contract on one car at the same time. It also checks against a car coming back too soon for a given repair. In this case if the repetition is found to be due to poor workmanship the workman is expected to "make good" by repairing the part without pay.

The piece-work plan is used by the Interborough for practically all jobs on which the workmen can be paid in accordance with the work done. However, as suggested earlier, some work is done under a bonus plan, principally car cleaning. To this work considerable attention was given in the 1912 article previously mentioned. The base daily wage rate is fixed for a reasonable number of cars washed per day. For all cars washed above this number the workman receives one-half of the rate per car that formed the basis of the daily wage. This plan seems better adapted to the class of labor employed in car cleaning as the men appreciate the assurance of receiving at least a minimum daily wage.

The equipment department of the Interborough is thoroughly "sold" on the piece-work system. The maintenance work is costing possibly 25 per cent less than it would under the time system and the men are better paid and more contented.

W. E. Strait, superintendent of economy, has direct charge of this department.

A Study, Covering Fifty Shops, of the Various Methods Employed in Pressing Off Wheels to Bring Out the Function of the Holes in the Gear Blank, Looking Toward a Standardization of the Number, Size and Location of These Holes—The Principal Methods and Devices Used Are Described and Pictured

Methods and Equipment for Removing Wheels

By C. W. Squier
Associate Editor ELECTRIC RAILWAY JOURNAL, New York, N. Y.

A PROBLEM of considerable proportion in wheel maintenance has gradually been forced upon electric railways, due to the trend of car and motor design. This problem is as to how wheels at the gear end of axles can best be removed without bending the axles or breaking the wheels. In the days of split gears, these could be removed readily and hence did not present any obstacle to wheel removal. When solid gears were first introduced, they were made from steel castings, and in order that gear weight might be reduced, the designer put as large holes as possible into the web. Where spokes were used there was a large space between them. With these designs there was no difficulty in pressing off the wheel at the gear end and leaving the gear in place, as there was ample room for jack pins, which could be inserted in most any desirable position through the holes in the web or between the spokes of the gear.



Wheel Shop of the Twin City Rapid Transit Company, St. Paul, Minn.

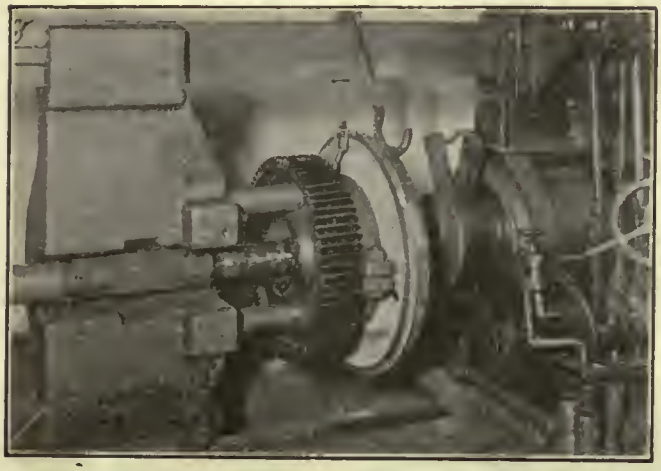
This shop occupies a space 50 x 80 ft., adjoining the truck shop. It contains the following machine tools: One wheel-turning lathe, one 200-ton hydraulic press, one standard wheel-boring machine, one double-head 48-in. boring mill, two wheel-grinding machines, one cutting off and centering lathe, one axle turning lathe, one axle grinding machine, one lathe equipped for boring a 2-in. hole through axles end to end, one milling machine, one key seater used on pinions, one gear cutter, capacity up to 60 in.; two cast-iron axle racks, one 100-ton hydraulic axle straightener and four electric hoists for serving the various machines.

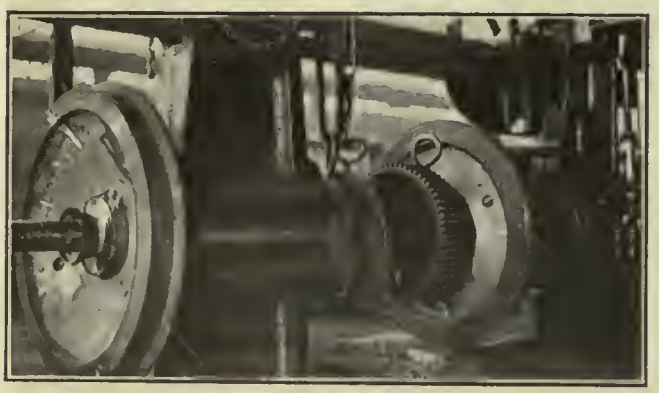
When forged gears were first introduced, manufacturers followed the same general practice of putting as large holes as possible in the web. These holes were usually 3½ in. in diameter and were usually spaced on a 14½-in. diameter circle. This was in the days when practically all gears used with railway motors in city service were three pitch and usually had in the neighborhood of from sixty-five to seventy-one teeth. With these gears there was ample room for holes in the web, and the use of jack pins for removing wheels was the general practice.

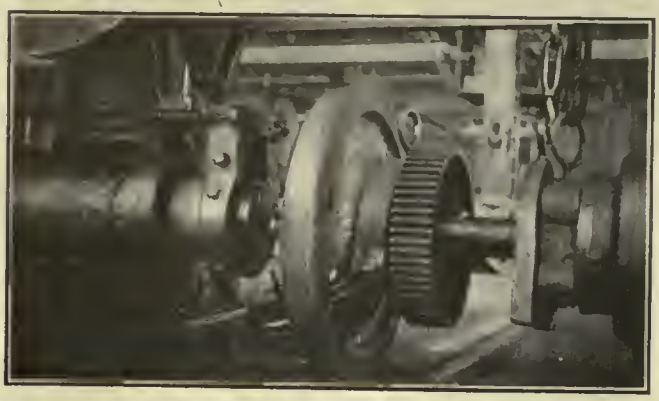
When forged gear blanks began to be made for use on interurban cars, it was found necessary to use large hubs for the gears and frequently the outside diameter of the gears was very small. As a result, the space for web holes was considerably reduced, and the sizes dropped to as small as 1¾ in. in some cases, and in others it was found necessary to eliminate web holes entirely. With the introduction of the safety car, it was found impossible to maintain the same center distance between the web holes or to use the same diameter for these holes.

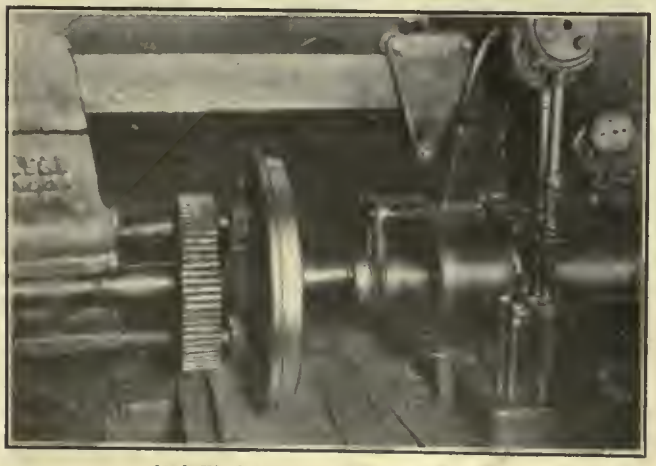
As a result of these advances in car design and service, nearly every gear has now developed into a special engineering problem for the location of the web holes. If the railway operator has a dozen different types of motors, the gears that are furnished for the different motors may have a dozen different sizes of web holes and different spacings of centers.

Some time ago the Carnegie Steel Company, which was the leader in forged gear blank production, endeavored to build up a series of standards for the size and spacing of the web holes. Considerable difficulty was experienced, however, in deciding on sizes which would cover satisfactorily the large range. Another complication arose from the fact that a different die may be used for two gears that, from the customers' standpoint, seem alike, one, however, being used on a larger axle than the other, which necessitates a larger hub and therefore a different die. Of course, this affects the space available for web holes. Another difficulty which prevents location of the holes close to the hub comes from the sloping web of the gear. This makes it necessary to locate the center of holes at the bottom of the dish and also to limit the size of the holes. Otherwise, in starting to drill the web hole, the drill point would not touch the web, so that in effect it would be trying to drill a hole with the side of the drill. At the present time, the American Gear Manufacturers' Association has a committee working on this subject and the Carnegie and Cambria Steel Companies









Jack Pin Methods of Wheel Removal

At top—Jack pins through web holes in gear, together with clamping collar between gear and wheel, used by the Capital Traction Company, Washington, D. C.

Second and third views—Jack pins through web holes in gear, together with yokes at ends of jack pins, used by the Louisville Railway.

At bottom—Jack pins through web holes in gear, with U-shaped yoke between gear and wheel, used by Twin City Rapid Transit Co.

have developed some tentative standards which are being considered for recommendation to various committees interested in this subject.

"JOURNAL" MAKES STUDY OF PROBLEM

The foregoing summary of the development of gear blank design indicates how the problem of removing wheels at the gear end of axles has gradually been complicated for car maintenance men, and a large variety of special tools and fixtures have been designed in order to care for the new condition. Realizing that this problem was of particular interest to the operators, the ELECTRIC RAILWAY JOURNAL sent out a questionnaire to obtain information in regard to the various practices in use and the difficulties which were experienced. This information has been added to through personal visits to a large number of electric railway shops, so that altogether information has been obtained from more than fifty electric railways regarding the practices used.

Before taking up a description of some of the methods used and the special equipment found necessary for removing wheels, it will be interesting to note the various sizes of wheel presses employed and the maximum pressures found necessary for removing wheels. Information obtained indicates that the wheel presses range in size from 150 to 400 tons. By far the largest number of electric railway shops, however, are using the 300-ton size. Pressures used for removing wheels vary from 70 tons to 350 tons. However, with pressures in excess of 150 tons, there is danger of breaking the wheel or bending the axle, and a large number of railways heat the hub of the wheel where high pressures are found necessary rather than to increase the pressure to dangerous amounts. From the information gathered, it appears that for cast-iron wheels safe working pressures range from 75 to 100 tons, and for steel wheels from 125 to 200 tons.

SOME METHODS USED FOR REMOVING WHEELS

Various devices have been developed by electric railway shops in order to utilize their presses for removing the wheel without removing the gear. Some roads, particularly those which have interurban service or high-speed rapid transit service, such as elevated or subway trains, have adopted the practice of removing both the gear and wheel at the same time. These roads take advantage of the wheel and gear removal to examine the axles for flaws and to test them for trueness. The majority of cars in this class of service have large motors, and as a result, the gear and wheel hubs come very close together. Where both gear and wheel are removed at the same time, the usual method consists of holding the gear stationary by means of a heavy yoke, which rests against the stationary yoke of the wheel press. Pressure is applied to the outside end of the axle, so that this is really pushed through the gear and wheel. Where possible most roads leave a little space between the hubs of the gear and wheel; so that the gear will move first. This, of course, reduces the pressure necessary for the initial movement. When the axle is moving through the gear the pressure, of course, is again increased when the gear hub comes in contact with that of the wheel. After the wheel is started, the pressure again reduces. Of the various railways from which information was obtained about one-sixth were found to employ the practice of pressing both gear and wheel off simultaneously. In general, the practice is to return the gear to the same size axle.

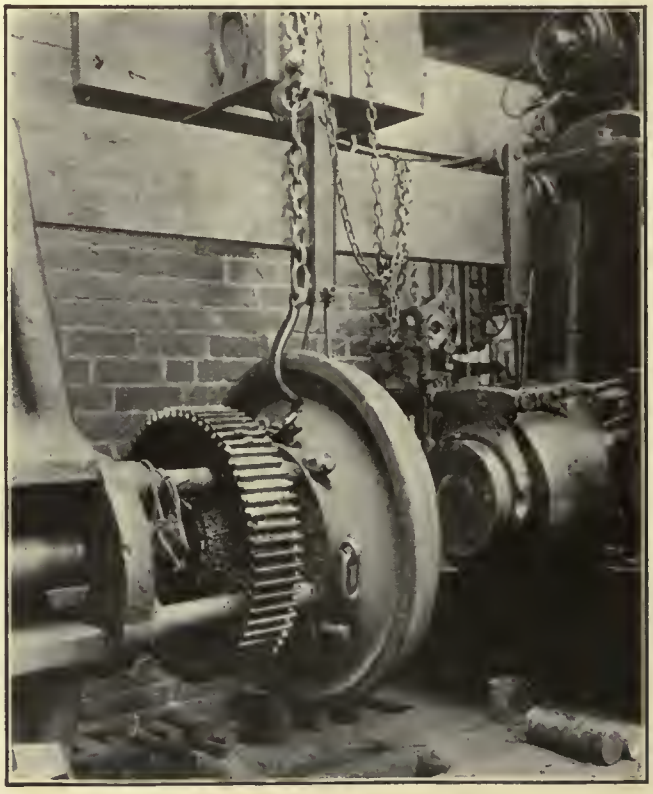
The methods used for removing wheels without removing the gears can be divided into two general classes: First, the use of jack pins or a device with pins which operate through the web holes in the gear and thus press against the wheel as near to the hub as possible. The second class of devices are those which are applied outside of the gear diameter, and in most cases the wheel is pushed off by having a rigid support for the wheel at the rim. With this latter method care must be used to make certain that the pressures are not excessive, otherwise there is danger of breaking the wheel or bending the axle, since the point of support is so far from the axle. From the information gathered, it is learned that more than one-half the railways use the web holes in the gear and either jack pins or special devices to apply pressure to the wheel; one-third use devices applying pressure to the wheel outside the gear circumference.

Of the railways using jack pins, the most common method seems to be to employ a split collar between the gear and the wheel. This type of collar usually has lugs on either side and the two parts are held together by bolts. An accompanying illustration shows this method as used by the Capital Traction Company, Washington, D. C. In this case the cast-steel collar or "wedge block," as it is termed on that system, has a plane surface on one side, while the other side is turned to fit the contour of the web of the wheel. The web of the gear shown in the illustration has holes 3 in. in diameter, spaced on a 14½-in. diameter circle. As the wedge block is made in two pieces and bolted together, this can be enlarged, if found advisable, so as to accommodate a different diameter for the spacing of the web holes or even to such an extent as to put the pressure outside the gear if necessary. In the illustration the gear is a seventy-tooth three-pitch type, and the wheel is 31 in. in diameter.

One railway which employs this method reports that eccentric jack pins are used so as to overcome the difficulty when web holes in all the gears are not uniformly spaced. This latter road uses a U-shaped block bolted to the head of the wheel press, and four eccentric jack pins. The collar between the gear and the wheel is of cast steel, having one side straight and the other concave to fit the wheel surface.

Other roads which use this method have found it necessary to enlarge the holes in the web of the gears by cutting out with an acetylene torch. Thus, one road reports difficulty where the holes were but 2 in. in diameter. The small jack pins necessary buckled under the pressure. These holes in the web of the gear were cut to 2½ in. diameter, and larger push pins have been used satisfactorily. In this connection care should be used in the manipulation of the torch, as it is possible to injure a treated and hardened gear so as to decrease its durability and set up serious strains. Chrome nickel or nickel steel push pins may also be used to give a stiffer construction with less tendency to buckle.

Several roads use a horseshoe-shaped yoke between the gear and the wheel instead of the split collar. Jack pins are then used through the web holes, resting with one end against the yoke and the other end against the frame of the wheel press or against other U-shaped yokes to take up the necessary space. Accompanying illustrations show this method as used by the Louisville Railway, and also by the Twin City Lines in St. Paul, Minn. The yokes are fitted with an eye-bolt for convenience in handling and have one side shaped so as to







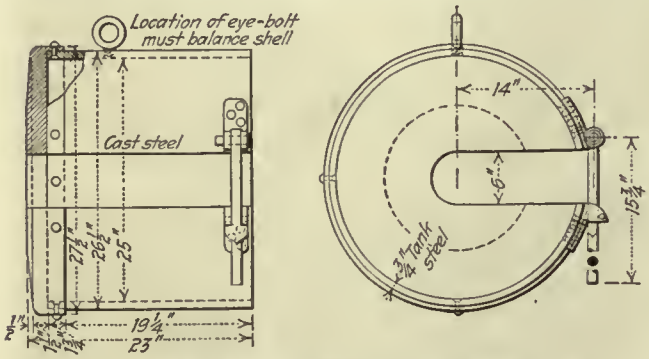
Stool-Type Equipment for Wheel Removal

At the top—Stool with legs through web holes in gear, together with clamped collar between gear and wheel, as used by the United Electric Railways, Providence, R. I.

Center and bottom—Four-legged stool split and hinged to provide for placing around axle, together with clamping collar, used by the United Railways of St. Louis, Mo.

form a good bearing surface against the wheel face, where they fit around the axle. On some roads which have wide gage lines so that there is considerable space between the hub of the wheel and that of the gear, the yoke is made to fit against the hub of the wheel with a projection at the top to reach the wheel web.

Some roads employ the jack-pin method with a yoke between the gear and wheel where gears are provided with web holes, but where the gears are not furnished with holes or with holes of small diameter, a heavy bar



Thimble Attachment for Pressing Off Car Wheels Used by the Birmingham Railway, Light & Power Company, Birmingham, Ala.

is placed against the rim of the wheel and the jack pins are then used outside the gear.

A number of roads which reported using the jack-pin method made no mention of using either yoke or a split collar between the gear and wheel. Due to the sloping surface at the hub of the wheel, however, there is danger of bending the jack pins or of causing excessive strains to the gear or wheel which may result in breakage of the wheels or bending of the axles unless some sort of plane surface is provided for the ends of the pins to rest against. One road reported the use of a special head, which it had welded to the wheel press. This head is provided with receptacles for the jack pins, so as to give them a somewhat firmer support than that provided by simply resting against the press frame.

Several roads which essentially employ the jack-pin method report a much more elaborate fixture in the shape of a stool with one side left open so as to pass over the axle. Stools are provided with either three or four legs, depending upon the number and spacing of the web holes. The legs extend through these holes and rest against a collar between the gear and wheel, or a U-shaped yoke. Accompanying illustrations show this method as used by the United Electric Railways of Providence, R. I., and the United Railways of St. Louis, Mo. The use of such a stool makes it unnecessary to use an additional yoke for the jack pins to rest against at the wheel-press end, and in addition the legs have a very firm support at one end so that there is less danger of buckling or bending. The form of stool used by the St. Louis Company is split through the center and has a hinge arrangement at one side, so that this can be opened and inserted around the axle, and then clamped together.

The Wilmington & Philadelphia Traction Company has wide gage track. It uses a slotted stool type of fixture, and in addition a casting which fits between the wheel hub and the gear. This casting is slotted so that it can be installed over the axle. One end is made small enough to fit against the hub of the wheel while the other end is considerably larger in diameter and has a flat surface against which the ends of the stool legs rest. The head of the stool fits against the frame of the wheel press as shown in the accompanying illustration. Hook bolts are installed in the various parts for convenience in handling, and also to provide a support by means of chains while the wheel pressing operation is taking place.

Present Practice Regarding Size of Web Holes and Spacing

In connection with the use of jack pins or the stool method for removing wheels, it is interesting to note the present practice in regard to the size of holes used and also the spacing desired. Information was obtained from the various roads in regard to this point. The sizes of holes vary in diameter from 2 in. to 3½ in., with the majority using 2½ and 3-in. holes. In regard to the spacing, all seem to agree that it is desirable to have the holes as close to the hub as practicable. Present practice indicates the use of either two, three or four holes on a circle varying in diameter from 11½ in. to 15 in. The majority of railways expressed the opinion that some definite spacing was desirable, although several stated that they could accommodate their tools to almost any spacing, but of course permanent devices would require modification if the diameter or spacing



Four-Legged Stool, Together with Special Collar to Go Between Gear and Wheel Hub, as Used by the Wilmington & Philadelphia Traction Company

was changed from the present practice. If a standard were adopted, however, they could readily arrange their devices to take this standard, and then there would be no further changing.

Information was also obtained as to how the various railways remove their wheels, if the gears have web holes, diameter of holes, or spacing differing from their standard. The following are some of the answers received to this question:

"With small gears we remove the wheels by using a cast-iron block, putting pressure against the rim of the wheel. I should object very strongly, however, to the entire elimination of the holes in the web of the gears which are large enough to have them, as they prove of considerable advantage."

"As yet have not had to remove any wheels with small gears. When the time comes, we will probably use a steel thimble to surround the gear and push against the rim of the wheel and will heat the hub of the wheel so as to facilitate removal."

"Where gears do not have holes in the web, we use a yoke on the front block on the wheel press, and then use the push pins on the outside of the gear, with the ends against the rim of the wheel."

"Where gears are not provided with web holes, we either press off both gears and wheels at the same time, or our most recent practice is to burn web holes in the gears with our oxweld outfit."

"We have no such condition at present, but if such was the case, we would use a shell over the gear, with one end resting against the press and the other against the rim of the wheel."

"Where the web holes do not fit our fixture, we cut holes or enlarge them with the oxyactylene torch. We have not removed any wheels without holes in the gears so far, but for our safety car wheels we will probably make a special fixture to go over the outside of the gear."

"In some cases we are able to remove the wheel by placing two steel blocks against the rim of the wheel outside of the gear, but if the wheel does not start at a pressure less than 70 tons, we then press off both gear and wheel together. On the larger sizes of axles we usually heat the hub of the wheel with a gas burner in order to reduce the pressure necessary for pressing off."

A considerable number reported that where gears have no web holes both gear and wheel are pressed off at the same time.

Use of Devices Over Outside of Gears

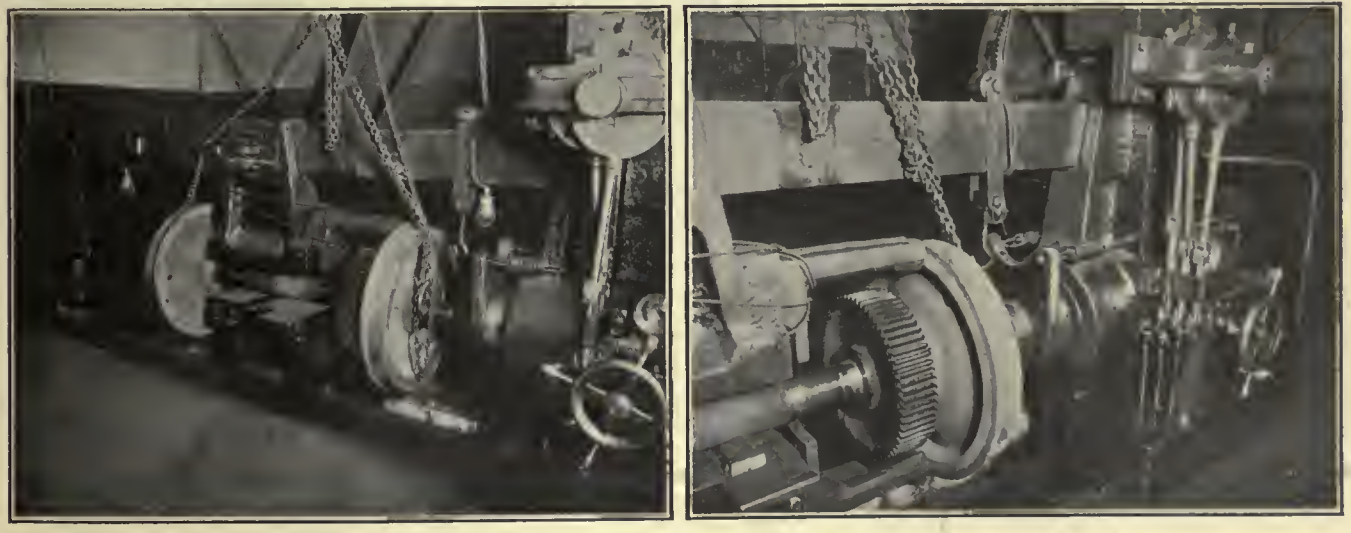
Another class of devices used is of the type which passes over the outside of the gear, and either presses directly against the rim of the wheel or else has collars or extensions to go down to the hub of the wheel. In the information obtained it was found that a large number of roads use rectangular steel blocks, with the ends resting between the frame of the wheel press and the rim of the wheel. A slight modification of this is used by a number of railways which consists of the use of a steel collar, which is inserted between the gear and the wheel. The rectangular bars then rest against the top of this steel collar, and the strain is transmitted over a larger surface of the wheel than would be the case with bars resting directly against the rim of the wheel. The steel bars most generally are about 2 in. x 6 in. in cross-section and of varying length depending upon the space necessary to provide clearance for moving the wheels.



Large Round Bars Outside of the Gear, with Special Yoke on Wheel Press, Used by the Northern Ohio Traction & Light Company, Akron, Ohio

An accompanying illustration shows the equipment used by the Northern Ohio Traction & Light Company in its Akron shops. Round bars are used over the outside of the gear and rest against the rim of the wheel. A special casting has been made to receive the ends of the bars as they rest against the yoke of the wheel press.

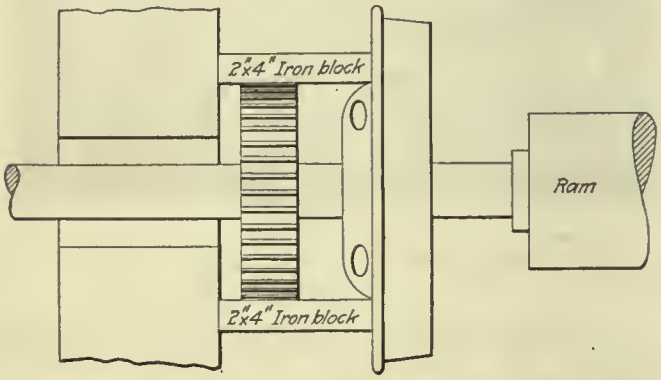
The line cut shown on page 450 illustrates a steel thimble as used in the shops of the Birmingham Railway, Light & Power Company. The cylindrical portion passes over the gear and the closed end portion rests against the wheel. A. Taurman, superintendent of equipment, reports that since putting this tool into operation he has found that the pressure necessary to remove a wheel from the axle is greatly reduced. This is due to the fact that there is a more even distribution



Special Yoke with Arms Extending Over Gears Used by the East St. Louis & Suburban Railway

of the pressure on the wheel than is possible to get with any device which depends upon pins projecting through the gear. The pressure necessary to remove the wheels in the Birmingham shops at present corresponds very closely to the pressure with which they are applied, which was not the case before this device was used. The bending of axles has been entirely eliminated.

The Tri-City Railway in its Rock Island, Ill., shop uses a large semicircular steel collar, which extends around the circumference of the gear and fits snugly against the frame of the press and the flange of the wheel. A description of the method used by this company in removing its wheels was published in the ELECTRIC RAILWAY JOURNAL for Jan. 17, 1920, page 161. The use of special devices in connection with wheel mounting and wheel removal work has greatly simplified the process, so that it is carried out by one man



Push Bars Over Gear Used by the Eastern Massachusetts Street Railway, Chelsea, Mass.

with practically no lifting and requiring very little special skill.

The East St. Louis & Suburban Railway uses a U-shaped casting with two arms which extend outside the gear for removing wheels. This device is made of cast steel, and the ends of the two arms rest against the rim of the wheel to be removed. Accompanying illustrations show this device and its method of use in removing wheels. It is pictured in use with steel wheels, but the company reports that it works equally well on cast-iron wheels and that no difficulty has been experienced in breaking or bending of axles.

Some of the comments made by master mechanics regarding their practice and what is desired in order to produce simpler and more universal methods of wheel removal practice are of interest and are given in the following:

"We use both the yoke and push pin method. Our only reason for preferring holes in gears is to kill the noise and stop the ringing, which we have found particularly annoying with solid gears."

"We remove gears at the time the wheels are removed, so that the axles may be placed on lathe centers and tested for trueness and to permit an examination for flaws. Experience has shown us that it is a dangerous practice to try to remove the gear and wheel at the same time where the hubs meet, because the starting pressure for each is so great that in order to start them moving a sprung axle often results. Our road operates interurban cars with steel wheels."

"On interurban wheels we have never tried to remove the wheels without removing the gears. The holes through the web of the gear in this class of equipment do not come in such a position that it is possible to use them, as they are opposite the curved surface of the web of the wheel, which makes it impracticable to apply sufficient pressure to remove the wheels. For interurban service, it is necessary that the gear and wheel hubs come very close together. We have made it a practice to see that there is space left of at least ⅛ in. between the gear hub and the wheel hub, so that in pressing off the gear and wheel, the gear will be started first, as we find that the pressure required to remove the wheel and gear at the same time is very much in excess of that required by this practice. As a rule, the minimum pressure required on a 7-in. wheel fit is 70 tons, being 10 tons per inch of diameter. The maximum pressure for this fit is around 85 tons. We frequently find that a pressure of 150 tons is insufficient to remove the wheels. In cases of this kind we heat the wheel slightly with a large kerosene oil torch in order to avoid excessive pressure, which is liable to spring or bend the axle."

"We have found it good practice to remove the wheels with the gears, due to the fact that on a cast-iron wheel you cannot get a solid or true enough surface in order to press the wheels off, and with high pressures there is danger of bending the axle. Very high pressures are necessary with steel wheels, and consequently the danger of bending axles is more pronounced. It appears to us that steel wheel manufacturers should provide a flat space on the face of the wheel and thus give a solid foundation for pressing the wheels off without pressing the gears off at the same time."

"On our 26-in. and 27-in. diameter wheels, we are preparing to use a steel casting in the form of a cylinder large enough to fit over the outside diameter of the gear and press off the wheel by bearing against the back of the press. If this steel cylinder will do the work, the need for openings through the web of the gear will, of course, be eliminated, and I am in hopes that the results will prove satisfactory."

From the foregoing it is evident that wheel removal practice is closely connected with gear design. It seems to be quite essential that the web holes be incorporated in gears wherever space will permit, since more than one-half the railways now make use of them in pushing off wheels. Their presence provides a convenient method of wheel removal and allows pressure to be applied to the wheels at points close to the hub, so that there is less danger of wheel breakage or bending of axles. Aside from their use in connection with the removal of wheels, they are also of advantage in reducing weight and breaking up vibration which results in noise. All concerned, however, will be benefited by a standard size and location of the web holes, and any changes in special wheel removal fixtures that might be required if definite standards were adopted could be easily made.

Where web holes cannot be incorporated conveniently, or where they are of insufficient size to permit of use for wheel removal, it is evident that with proper precaution the method of wheel removal with the use of devices placed outside the gear will prove entirely satisfactory. Roads using this method prefer it to the jack-pin method, and when the devices are once made, there is no further need to worry about the size and location of the web holes.

Engineering Symbols and Abbreviations to Be Standardized

AT THE request of a number of national societies, the American Engineering Standards Committee recently called a conference of representatives of interested organizations for the purpose of starting a movement to standardize symbols and abbreviations. The conference decided to include, as part of its project, the graphical symbols used in engineering drawings, diagrams and the like, for representing instruments and apparatus and component parts of them. The work will go forward under a committee organization developed in accordance with the rules and procedure of the A.E.S.C. The co-operation of foreign standardizing bodies will be sought.



Gasoline-Driven Tower Truck

The Power Distribution System and Its Maintenance

A Summary of the Elements of a Good Distribution System with Detail of the Plans Used on a Large Railway Property for Keeping the Overhead in Condition—Records Play an Important Part in This Work

By M. B. Rosevear
Superintendent of Distribution, Public Service Railway, Newark, N. J.

ELECTRIC street railways are an important element of our national transportation facilities, and the power distribution system of an electric railway has as its center the power station, from which radiate the feeder cables which must deliver to the cars under all conditions the energy required for successful operation.

The first problem of the distribution engineer is the proper location of this source of power. This is true not only in the case of a new property but should be kept prominently in mind even on established systems.

We may now be said to be in the third stage of development with respect to the source of power supply. The first stage was that of the engine-driven, direct-current generator, which, if properly planned, was so located that coal, water and other essential supplies were conveniently available in sufficient quantity, of proper quality, and at reasonable cost. This resulted in the concentration of heavy loads at single stations and it was necessary to transmit power at high cost for long distances.

The second stage was that of the manual substation, power being transmitted from the generating station to the substation at high voltage and therefore with greater economy, and then distributed from the substation to the cars at trolley voltage. This method was an improvement over the first, power being generated in greater quantities by more efficient plants, which did not need to be located so close to the car lines as with direct-current stations. The load was divided among several substations, and this better distribution made possible the satisfactory operation of larger electric railway systems. But even then there was still too great a concentration of load at single stations and the feeding distances were still too long.

The automatic substation has marked the third stage, bringing our direct-current supply source even closer to the car, the ultimate consumer, and reducing not only labor costs, and losses on both the positive feeders and negative return, but, as has been demonstrated by the numerous existing installations, giving more satisfactory operating results than is possible with manual operation. Although the automatic railway substation has been used for a number of years and has passed the point of being merely experimental, it is yet susceptible of further development. The relative merits of the single unit and multiple-unit automatic substations are worthy of careful consideration, but frequently the practical problem of obtaining suitable property, especially where there are zoning laws and other limitations, may be the determining factor.

While there are as yet no automatic substations on our property, they have been a subject of intensive study and we expect before many months to have one or more in operation. One phase of our problem is limiting damage from underground cable failures. With manual operation of supply stations there have been occasions on various properties when the failure of a large-capacity cable has had disastrous results, damaging other cables and at times even burning up entire duct lines. Automatic substations in underground territory, therefore, require protective apparatus that will

immediately disconnect a cable in case of failure, and not permit its reconnection until conditions are safe, and yet not interfere with operation under normal conditions even with typical railway load fluctuations.

SECTIONALIZING THE TROLLEY IS A FACTOR IN MAINTENANCE

In the second place, the distribution engineer is concerned with the sectionalizing of the trolley wires. Fig. 2 shows the various trolley sections on a portion of one large railway system, the details being described more completely later. In general, section insulators are placed near junction points, loops and turn-back points, and so located that in case of a wire down, or power off on one section, the interruption to service will affect



Fig. 1—Trolley Ear on Which Maintenance Is Low

only a restricted district. In case of long delays, cars can be turned back at crossovers and loops. Still further sectionalizing may be required if the service on a given section is too heavy for a single circuit. In the congested portion of the system above referred to some of the sections are less than 1,500 ft. long, while two important intersections have special feeders. Our experience has made us limit the size of sections in congested territory to an average of 1,500-2,000 amp., that is, to the capacity of two paper-and-lead cables of not more than 1,500,000 circ.mil area each, and usually 1,000,000 circ.mil each.

Car service and routing must be carefully checked in order to note changes in loading. While this may be done by watching the time-tables, there are times when trippers are used without being shown on the table, and there may be other factors, so that we have found it helpful to have "five-minute" readings taken once a month for the peak load from 5 p.m. to 7 p.m. for every railway feeder at every station. These are averaged for the highest thirteen consecutive readings and listed, with the maximum swing, in a book for ready reference. While this method is admittedly somewhat rough and ready it has been found by years of experience to give a very helpful check on individual section loads. A special check or study of a particular section may be made if the "load book" indicates that it is advisable. Such follow-up methods may require installation of reinforcing feeder or may permit removal of feeder or its transfer from one point to another.

THE FEEDER SYSTEM FROM THE MAINTENANCE STANDPOINT

The distribution of power from the supply station to the trolley section may be by either aerial feeders or underground cables. There are places where the placing of cables underground is proper, there are other places where only the aerial feeder would be considered. In those places where the question is at all debatable the placing of railway feeder cables underground should be avoided as long as possible for several reasons. For one thing, an underground cable is more subject to failure because it cannot be completely inspected; tests that can be made with present equipment have not proved entirely satisfactory; it is subject to mechanical injury, and being connected to the aerial trolley may at times be damaged by lightning. It also has a more limited current-carrying capacity and not only costs more of itself but requires the construction of a con-



Fig. 2—Large Scale Map for Use in Maintenance of Distribution System

duit line, or rental of duct space from another concern; both of these increase the cost, and the joint use of duct lines has the further disadvantage of increasing the hazard in case of cable failure.

Inasmuch as the electric railway must maintain its poles for the support of the trolley contact wire, there is no compensating saving for the extra hazard and expense of placing wires underground.

Where only 600-volt d.c. cables are concerned, periodic tests of insulation resistance may tend to reduce failures. These tests may be made with a megger or with a voltmeter of very high resistance, say 1,000,000 ohms on the 750-volt scale. We have found the voltmeter method preferable.

Where higher voltage cables are involved more elaborate tests are necessary, as was brought out at the recent convention of the American Institute of Electrical Engineers.

Securing a Substantial Supporting Structure

Probably wood poles have been most extensively used for the support of the overhead wires, but the increasing scarcity and cost, particularly of chestnut poles, which have been used extensively in the East, makes it advisable to substitute poles of a more permanent character. This may be done either by proper methods of preservative treatment for wood poles (a subject now under consideration by a special committee of the American Electric Railway Engineering Association) or by use of metal or reinforced concrete poles. Where metal poles are used, care needs to be exercised in the selection of a pole that can be readily reinforced at the ground line where it is most subject to corrosion. It is also important that metal poles be so designed that there are no shelves or pockets where moisture may collect and increase the corrosion. For illustration, the specifications of the A. E. R. E. A. Manual section Ds-5b, for tubular steel poles require "the top of the outer pipe to be chamfered to shed water" at joints.

Poles of structural shapes, whether made from one piece, as the Bates pole, or built up of several pieces, should be so designed that they can be easily inspected, cleaned and painted.

The reinforced concrete pole has given satisfactory service when properly designed and would probably be more generally used were it not for the greater weight involved. This objection has been overcome to some extent by centrifugally cast, hollow poles—the Massey pole for example—which give a denser structure and greater strength for a given weight than is found in the solid pole.

In city service the joint use of ornamental poles for both railway wires and street lighting is desirable. A photograph reproduced illustrates such a combination pole which has been used extensively and given satisfaction. This pole is 30 ft. long, and weighs about 800 lb. with the reinforcing sleeve at the ground line, the sections being 5-6-7 in. nominal diameter. A slot is cut in the pole below the ground, and the lateral cable for the lamp brought directly from the manhole and up inside the pole and bracket, through a second hole in the pole, to the lamp. It will be seen by looking at the line on the opposite side of the street that several railway aerial feeders can be mounted on a crossarm, the whole making a neat, attractive installation.

The maintenance cost is also somewhat less to the railway in the case of joint poles as the railway company construction, unless it has transmission lines, is always in the lowest position, and it therefore uses the shortest poles of any utility. Care must be exercised in agreeing to joint pole use not to increase maintenance costs, each company being entitled to show some benefit to itself as well as contributing to the general improvement in appearance.

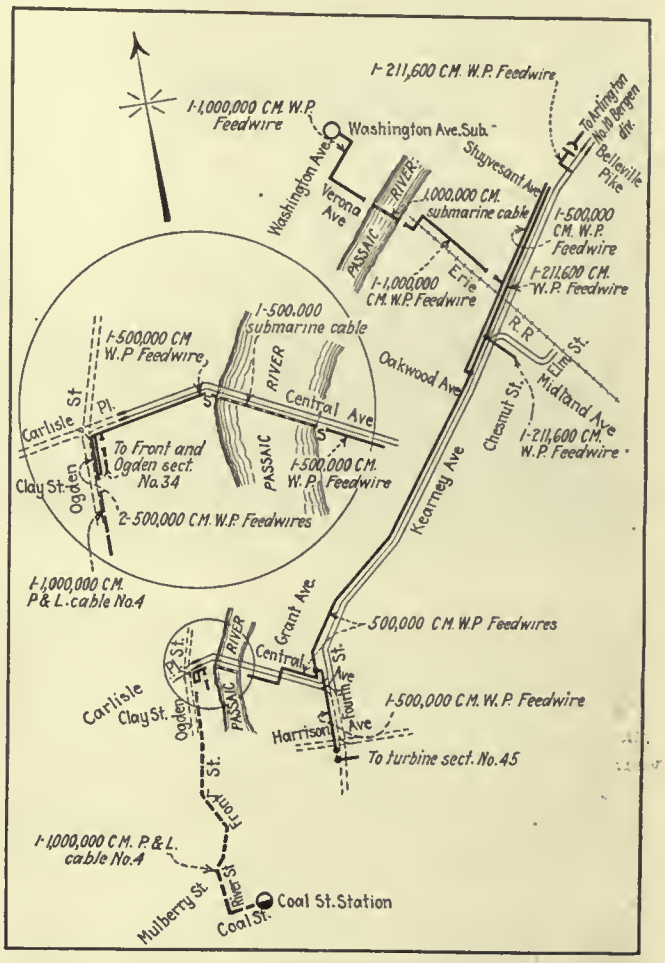


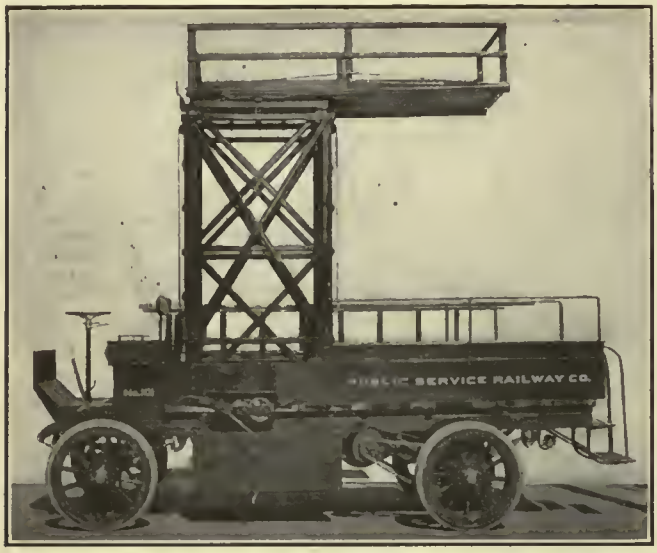
Fig. 3—Sample Individual Section Map as Used on One Large Property

Special Ear for Reducing Trolley Wire Wear

The cost of replacement of trolley wire is the largest single item of expense in the power distribution group of accounts. Therefore anything which serves to reduce the wear and increase the life of the wire is of direct financial value.

In general, the wear on trolley wire at the ear governs the length of time the wire can be kept in service. With this in mind a type of ear was developed for our use about five years ago which it was believed would reduce the wear. The principal feature of this ear (See Fig. 1) was a gradual taper from each end to the center directly under the boss where the ear fastens to the hanger. The ear is cast, of the clinch type. At each end it is merely deep enough to come slightly below the middle of the wire, after being clinched, while at the center it is deep enough almost to encircle the wire.

This ear was installed with new trolley on a test section on an upgrade, where for many years the average life of wire was about two years. In November, 1922, the wire was finally replaced after four years service, which means that the life of the wire was doubled merely by changing to the new style ear, the car service being if anything somewhat increased over



Electric Vehicle Which Has Served More Than a Decade in Overhead Maintenance Work

the earlier period. After renewal the old wire was found to have a cross section equal to 66 per cent of that of the original wire. It is of further interest to note that the new ears wore just as long as the older type, six sets of ears having been used during the four-year period. It was found that the wire at the point of support did not wear so as to require installation of any splicing ears prior to July, 1922. While we have no similar definite figures for the old type ears we know the record with the new type is much better in this respect.

It is also interesting to know that an ear of very similar design has been used on the Market Street Railway, San Francisco, for a long time, and that both companies developed the improved type independently.

Equipment for Use in Maintenance Work

To take care of the routine and emergency work of the department, there must be suitable and satisfactory tools and vehicular equipment. The vehicle is used both as a means of transportation for men and materials and as a tool during the performance of the day's work.

Local conditions have great weight in the determination of the type of vehicle used. For the small property the horse-drawn vehicle may even today be the most suitable for highway use, while the line car is, of course, required for work on private right-of-way. On the larger property, particularly if scattered over a wide territory, a motor-driven vehicle is indispensable, and may be operated either by an electric storage battery or by a gasoline motor, the choice of which again depends on local conditions. We have an electric vehicle, shown in one of the illustrations, which has been in service since 1912 and a second battery permits its use by both day and night crews. Where gasoline motor trucks are used experience has led to the adoption of two sizes of trucks.

For ordinary maintenance a 2-ton truck is needed, while a 3½-ton truck is necessary to carry reels of feed wire and trolley wire. Both sizes of trucks are equipped with adjustable Trenton towers and platforms. The three-section tower has lower center of gravity and reasonable height, making it possible to work on low bridges, of which we have many. It can also be raised high enough to permit work on the trolley at railroad crossings. Such an equipment is illustrated.

It will be seen that by placing boxes for tools and materials along the side of the truck over the wheels, space is provided for a reel stand.

The use of one large and one smaller truck permits the installation of trolley wire more quickly and efficiently than with horse-drawn or other older type vehicles, as both towers are used after the wire is run out and there is no idle equipment part of the day.

Records Are a Factor in Successful Maintenance Work

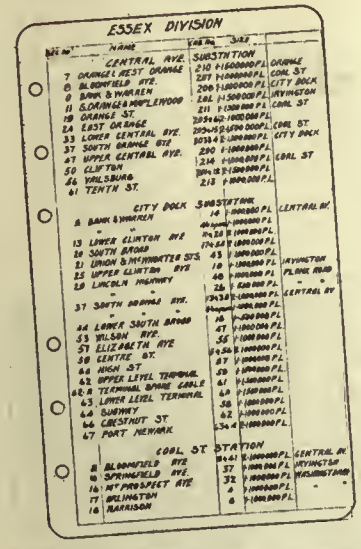
One essential requirement on any property is the preparation and continuance of adequate records, particularly those containing information for use in emergencies.

The first requirement is a large-scale map showing the physical layout of the property. On our system it is necessary to use several such maps, each division being shown on one or two maps, drawn to a scale of 1,000 ft. to the inch. Fig. 2 is typical, showing one-half of one large division.

It may be of interest to note the historical development of this map system. Originally these maps contained not only the line layout (using one line for a single track) but also showed the feeders from the power supply stations to and along each portion of the line. As the property increased in size and complexity, the feeders were omitted between the stations and the commencement of the trolley section, and a symbol was inserted at the feeding-in point denoting from which station the line received its power. The insertion of changes in feeders, etc., from time to time caused the tracing to become illegible or torn, and it had to be entirely retraced at frequent intervals. It was also difficult to show all the details clearly on a single map and it was too large for convenient reference. As a result we have for several years limited the information on the large maps to the following: (a) Physical layout of lines showing curves, connections, etc.; (b) loca-



Combination Pole Which Involves Low Maintenance Cost





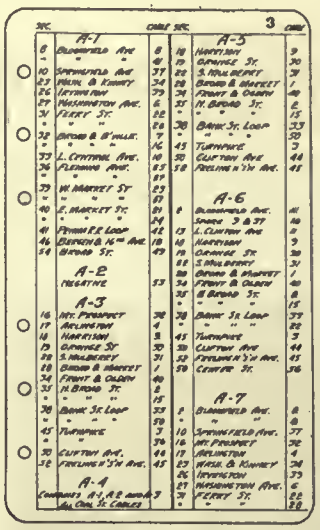




Fig. 4—Note-Book Leaf Containing Data as to Feeder Sections. Fig. 5—Data for Use in Equalizing Section. Fig. 6—Cables in Conduit Runs, with Corresponding Sections Fed by Them. Fig. 7—Underground Conduit and Manhole Data.

tion of section insulators; (c) number of each trolley section; (d) symbol denoting source of power—one or more—(e) automatic circuit breakers, and switches, for emergency feeds; (f) power supply for carhouses and shops.

Other detailed information as to feeder sections is shown on individual section maps, of which Fig. 3 is typical. It will be noted that aerial feeders, underground and submarine cables, switches, section insulators, etc., are shown by different conventions. These maps show the feeder in considerable detail from the power station to the end of the line. In addition to these individual section maps, brief written descriptions are used for further details.

Quite recently it was felt necessary to provide certain essential data in more concise form, therefore the pocket size data sheets shown in Figs. 4 to 7 inclusive were developed.

Fig. 4 is a list of sections fed by each power supply station and shows the number and name of the section, the cable number if in underground territory, the controlling or limiting size of feeder, as well as the name of any other power station which also feeds the section either regularly or in emergency.

Fig. 5 lists the sections that may be equalized with each other, giving the location and kind of equalizer and stating its normal position, whether open or closed.

Fig. 7 is a diagram of underground conduit and manholes, the latter numbered, whereas the reference notes A-4, B-8, etc., refer to Fig. 6, which lists the numbers of the cables in each conduit run, together with the name and number of the section which the cables feed.

These sheets in loose-leaf notebooks are invaluable aids in case of trouble and are furnished to the supervisory force, engineers and load dispatchers.

Changes of various kinds can be readily noted on all the records listed above; they rarely require retracing of maps, and even then the labor involved is relatively small when compared with that formerly necessary when we attempted to show everything on one large map.

In the preparation of this article on power distribution, the writer has endeavored to present certain general phases, rather than a technical discussion. It is hoped that it will be of interest not merely to those who have direct supervision over street railway power distribution systems, but also to the men who are directly engaged in the operation and maintenance of the lines, and possibly to persons in other departments who are concerned in the proper functioning of distribution systems, and their relation to car service.

High-Voltage Ring Connection

THE Detroit Edison Company, which supplies power to a number of electric railways in and around Detroit, is making a notable change in its power transmission system. The company proposes to establish a 120,000-volt transmission system around the territory in which it serves power. A large quantity of transforming and other apparatus has been ordered, the Westinghouse Electric & Manufacturing Company having been the recipient of a substantial order.

It is intended to tie the new 120,000-volt ring into the present 24,000-volt system at several points. The power at one of the existing power plants will be transformed from 12,000 to 120,000 volts in a bank of three single-phase transformers; it will be transmitted at the high voltage about 60 miles and then stepped down to 24,000 volts and tied in with the lower voltage system through a bank of three single-phase transformers. At an intermediate point the high-tension line will be tied to the 24,000-volt system through a third bank of transformers.

A Half Million a Year for Lighting

IT WILL cost $500,000 this year to light the subway and elevated trains, station platforms, track signals, and other facilities of the Interborough Rapid Transit Company, New York City. Of all the energy generated in its power plants 6.6 per cent will be required for electric light.

There are 320,000 outlets throughout the system, including those for 50,000 incandescent lamps in the subway cars, and 88,000 on the subway platforms and in the tunnels. Ninety per cent of the last-named burn continuously. The elevated trains require 45,000 lamps for lighting.

Track signals account for additional thousands of lamps. Every 400 ft. along the subway track is a blue lamp indicating the location of an emergency switch for shutting off power in the third rail.

Track Machinery in Boston

From the Time that the Old Paving Is Taken Up Until the New Paving Is Laid, Machinery Plays a Most Important Part in the Work



Plow Tearing Up a Pavement



Acetylene Torch Cutting Old Rails for Removal

FOR ten years the maintenance department of the Boston Elevated Railway has gradually been increasing the use of machines in connection with the reconstruction of the surface tracks of that system until now machinery does nearly all of the heavy and repetitive work. The following is an account of the procedure in track building, told briefly, because the accompanying pictures tell the greater part of the story.

Procedure in Rebuilding Track

After portable crossovers or temporary tracks are installed the pavement plow (1) is brought into operation. The usual length of track under construction varies between 1,000 and 1,400 ft. of single track. After the pavement plow has passed over the track, the paving blocks are piled on the curb, where they are recut by paving cutters. The recutting of blocks is done by contract.

Next, the acetylene torch (2) comes into play and the rails are cut into the length proper for handling.

This operation is followed by the crane car (3), which lifts both rails so that the ties can be knocked off by a sledge. The rails are then thrown to one side where they are picked up by the rail car.

This operation is followed by the electric shovel (4), which excavates the track trench to the proper depth. One man operates the shovel and under good working conditions can excavate the trench for a distance of about 800 ft. in an eight-hour day and load the material upon auto trucks or cars. The shovel works very closely to grade so that after it has passed along there is very little work to be done by hand. If there is any, it consists merely of smoothing up the material which has been left behind.

The shovels are hauled to and from the track jobs by service cars. When the shovels are excavating the track trench, they operate over short sections of portable track of light tee-rail construction. Each section is 5 ft. long and is handled by means of a short chain hitched to the heel of the dipper and as the shovel progresses along the trench, the boom is swung back through 180 deg. and a section of the track is picked up and carried forward and laid in front of the shovel. This operation repeated many times during the day consumes a certain amount of time which slows up the operation of the shovel. To overcome this objection the company is now arranging to equip the shovels with caterpillar treads in addition to the car wheels already mentioned, so that the shovel will use the treads while working in the trench. These treads will be permanently attached to the shovel. Means will be provided for lowering and raising them into and out of contact with the ground, and the car wheels will be used while the shovel is moving to and from the track jobs, as at present.

When the shovel has progressed for a sufficient distance the steam roller (5) is brought on the job and rolls the trench as fast as it is excavated. The steam rollers are moved to and from the track jobs by use of a ramp car, as shown in the engraving.

After the trench has been rolled the ties, rails and other material are distributed by cars (6) to the job. The rails are then spiked, the joints made up, and the rail joint base plates attached and made ready for welding.

The crushed stone for ballasting the track is delivered on the job by Differential cars. As the company has two hopper cars formerly used for coal, which have not been in use for this purpose for about two years, these cars (having a capacity of 25 tons) have been used to a certain extent because with their use the ballast can be dumped through the hopper in the bottom of the car directly in the track, saving any rehandling.

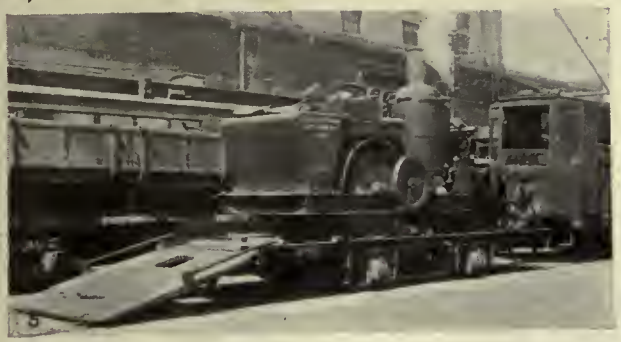
The company has a track, with a 100-ton track scale, in a local quarry, so that crushed stone is purchased at a very favorable price and delivered directly onto the company's cars.

After the ballast has been delivered, the track is jacked up to grade and surfaced with pneumatic tie tampers (8). A tamping gang consists of from eight to

Some of the Machines Used by the Maintenance Department in Boston

















No. 3 shows the crane car for lifting rails and ties. This is followed by the electric shovel (4) and this by the steam roller (5) to form the new sub-base. In this view the roller is shown on a flat car. Material for the new track is distributed by rail cars (6) and ballast hopper cars (7). The new ballast is then tamped by pneumatic tampers (8). The concrete is then put in place by means of the concrete mixer (9) which is used in connection with the concrete loader (10).

twelve tampers, and air is supplied from a compressor mounted in an old passenger car. The compressor is of sufficient capacity to operate a maximum of twelve machines. Spare tamping machines are carried on each compressor car in order that the work might not be held up in the event of any machine breaking down or while machines are being overhauled. When tracks under elevated structures are being reconstructed or repaired, the tie tampers are connected up with the air main on the elevated structure.

It is planned to weld the rail joints between the time the track is surfaced and the concrete base installed, but joints can be welded at any time during the process of track building by the seam weld method.

During the operations of tamping and welding the concreting material for the paving base is delivered by Differential dump cars and is placed alongside the track in proper position.

The next operation is the laying of the concrete paving base. The concrete mixer (9) is accompanied by a machine called a mixer loader (10). This loader is, in effect, a continuous belt, 45 ft. from center to center of belt pulleys. The frame is mounted on car trucks and the machine is self-propelling. A separate motor drives the continuous belt. There are three measuring bins, each of 8 cu.ft. maximum capacity and adjustable for lower capacity. These bins are mounted on flanged wheels and may be rolled along the top of the belt frame for the accommodation of the shovellers. These machines were built in the maintenance department machine shop.

The concreting material is shoveled directly into the hoppers above the belt, where it is properly measured and is then dumped onto the belt and carried into the mixer. It is possible to have three batches of concrete in progress at one time, this is, one in the loader or distributor, one in the skip of the concrete mixer and the third being mixed in the drum of the concrete mixer.

These two machines require very few men to operate them and it is possible to install a large amount of concrete per day with this outfit. All the concrete mixers and loaders are mounted on car wheels and are self-propelling.

The track is then paved and the concrete mixer and loader are again used for grouting the pavement.

Additional equipment not shown by the engravings consists of four air compressor units mounted in passenger cars; one portable air compressor mounted on auto trailer, with capacity of 210 cu.ft. free air per minute and two portable air compressors with wagon mountings of smaller capacity; two Ransome concrete mixers of 1 bag capacity used occasionally for grouting pavement, and a Clark concrete breaker. The latter is used to break up the concrete base.

Altogether the company has of the equipment described: One pavement plow; seven acetylene cutting outfits; three crane cars; two type "O". Thew electric shovels; two 10-ton tandem steam rollers, each with a ramp car; three rail cars; seventeen Differential and Universal dump cars; three bottom dump hopper cars of 25-ton capacity; 105 Ingersoll-Rand tie tampers; three Austin self-propelling concrete mixers; three loaders for concrete mixers; one Clark concrete breaker, seven air-compressor units.

The company has two storage yards, both having steam railroad and water connections. At the South Boston yard is located the maintenance department's shop where all of the rails are curved, cut and drilled for special curves or in connection with special work. At this yard is also an up-to-date treating plant where treatment is given to all of the ties used by the company, as well as the lumber used on the elevated structure and in the subways and to some extent for building work. The treating plant was fully described in a special article in the report of the committee on way matters, read before the American Electric Railway Engineering convention in Chicago, October, 1922.

In addition to labor-saving tools and equipment, the efficiency of the maintenance department is largely made possible by proper ordering, delivering and handling of material. During the busy season from fourteen to sixteen large track building jobs may be under way at any one time, and the material, equipment and transportation, consisting of cars and trucks required for each day, is determined upon the previous day. The orders for these are placed by the man in charge of each job with the material and equipment dispatcher at the main office, and it is his business to see that each crew is supplied with the material or equipment that it has ordered or may require. The operator of each car or truck receives his orders directly from the dispatcher and at the end of each trip reports to him for further instructions.

The company uses in its busy season in track building work from eight to twenty cars and from five to twenty trucks daily. The maintenance department owns five 5-ton Mack dump trucks and six 2-ton trucks used for various purposes. Additional trucks which are required daily are secured from contractors, the number of hired trucks varying in accordance with the work in hand.

In its report dated January, 1923, the Massachusetts Department of Public Utilities presents several tables showing the rise in cost of labor and material, the cost for track rebuilding and the miles of track rebuilt for a period of several years. The department then makes the following statement in regard to the track maintenance work of the Boston Elevated Railway:

"From these figures it seems reasonably clear that during the last trustee year relatively little more was expended for maintenance of tracks, building and equipment than was expended by the former management in the period before the European war, and that if any increase in the amount of repairs and reconstruction work done has occurred it must have been due to increased efficiency in methods used, either through introduction of labor-saving machinery, improvements in the art or economy of management."

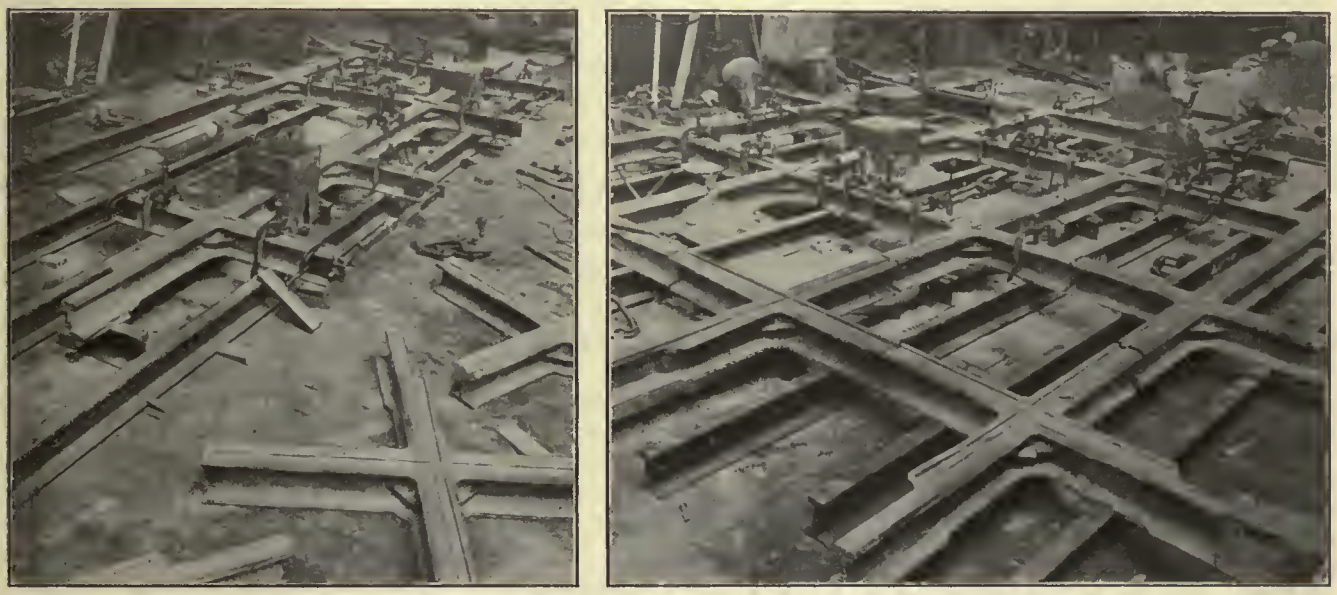
Public Utility Information for Students

FOLLOWING the examples of many other states, New Mexico and Wyoming are coming into line in furthering co-operation between the institutions of higher learning and the public utilities. In the State University of New Mexico public utilities are being systematically studied, and the State Agricultural College is preparing for similar instructions. Preliminary steps have been taken in Wyoming in the same direction. In Colorado students are learning the basic facts regarding electric railways and other utilities.

Chrome-Nickel Steel in Special Work*

A Scientific and Practical Discussion of the Characteristics of this New Steel Which Has Demonstrated Its Practicability in Milwaukee—Results of More than Three Years' Use Are Given—First Impetus to Develop the Steel Was Given by Prohibitive Wartime Prices of Ferro-Manganese

By F. G. Hibbard
Construction Engineer Way and Structures Department
Milwaukee Electric Railway & Light Company



Left—Thermit Welding of Joints in Crossing for East Water and Wisconsin Streets, Preparatory to Mounting on Bolted Foundation. Right—Thermit Welding of Joints in Crossing for East Water and Wisconsin Streets. Openings Shown Are for Inserts at Joints

DURING the last few years the Milwaukee Electric Railway & Light Company has installed in its tracks considerable special trackwork, in which the crossings, the frogs and some of the switch pieces were made of cast chrome-nickel steel. Much interest has been manifested both locally and throughout the country in these installations and their relative value compared to similar work constructed of cast manganese steel. It will be the object of this paper to set forth our experiences in the development of chrome-nickel steel as a material for special trackwork.

While the details of special trackwork construction have been greatly improved, in the writer's knowledge no new material has been offered the electric railways since the introduction of manganese steel in 1894, until we proposed the use of cast chrome-nickel steel in 1919.

Manganese steel was such a vast improvement over the other types that it seems to have been accepted by the manufacturers as the last word in materials for special work construction; and while no attempt will be made to discredit it, some of its disadvantages will be disclosed which are not apparent in our new alloy steel.

Considerations that Suggested Use of Chrome-Nickel Steel

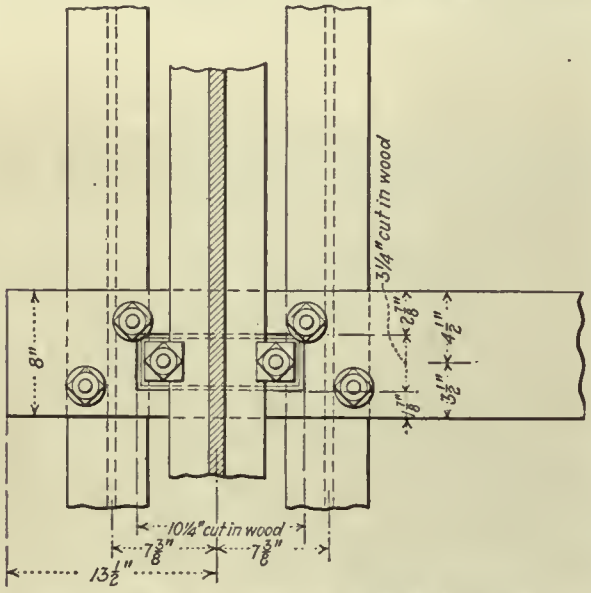
During the World War prices for materials used in the construction and maintenance of track rapidly advanced and deliveries were uncertain. For several years the rising prices of materials were not compensated for by increases in the company's revenue and every possible expedient was adopted to conserve materials and make existing track and special trackwork serve until adjustments in rates could be secured to meet this inflated cost of materials. This condition brought into active play the electric welding machine, which served to extend the useful life of thousands of dollars worth of expensive trackwork.

In attempting to weld cast manganese steel, it was found that while many good welds were made, others did not prove successful and actually hastened the necessity for renewal of the pieces repaired. No welding concern was found that would guarantee a weld on manganese steel. Even in the face of these facts we were reluctant to substitute anything for manganese steel until the price of that material advanced to a point where it was practically prohibitive. This advance in price was due largely to the increase in the cost of ferro-manganese, which in 1911 could be purchased for an average price of $37.51 per ton, but in 1917 cost $327.21 and in June of that year sold for $443.75 per ton, an advance of over 1,000 per cent. As a comparison, standard steel rails showed a maximum advance of only a little over 100 per cent during the war period, the cost advancing from $28 per gross ton to a peak price of $57 in 1918.

The company had already made considerable progress in the development and manufacture of its own special trackwork, having installed a large number of frogs and crossings of the steel bound type. These pieces

*This article is condensed from a still more comprehensive paper read by the author before the Technical League of the Milwaukee Electric Railway & Light Company.

were constructed by first cutting and fitting the rails to the proper dimensions, and then casting open-hearth or electric steel around the intersection, binding the rails together and forming a guard and a support for the wheel flange. This type of construction was comparatively cheap and possessed the important advantage that when the flange bearing was cut out it could be successfully built up with the electric welder, whereas if it had been constructed of manganese steel or with a



Details Showing Construction of Crossing Foundation

manganese plate at the intersection welding would have been resorted to only as a temporary and uncertain expedient to prolong the useful life of the piece for a time.

The success experienced with the home-made steel bound frogs and the excessive price charged for manganese steel trackwork were the principal factors that induced the company to extend the manufacture of its special trackwork in its own shops and accordingly the writer was instructed to seek a substitute for manganese steel, which could be machined and finished at the company's Cold Spring shops and which could be cast at local foundries. At that time a new local electric steel foundry with large furnaces, known as the General Steel Company, was in operation and the company had transferred its steel bound frog business to that plant. As this plant was casting heavy alloy steel ingots and its facilities were available, the situation was particularly favorable for the plans being developed.

Satisfactory experience with some special trackwork layouts, consisting of open-hearth steel castings with a carbon content of from 0.40 to 0.50 per cent, which were given a single annealing treatment, suggested the possibility of improving castings of this nature by adding alloys other than manganese. These layouts were successful in part because they could be successfully welded, which together with the practicability of machining was the important consideration.

By the addition of nickel and chromium the physical properties of carbon steel can be materially improved. Testimony to this effect has been furnished in the publications of some of the nation's foremost metallurgical engineers.

Eighteen years of experience in the design and construction of special trackwork for electric railways pointed to only one installation of an alloy steel other than manganese. The Pennsylvania Steel Company (now the Bethlehem Steel Company) had built an electric crossing with center plates of forged Mayari steel, a natural nickel-chrome alloy. This was installed in Omaha, Neb. Diligent search failed to show any installations of cast chrome-nickel steel.

First Installation, Made in 1919

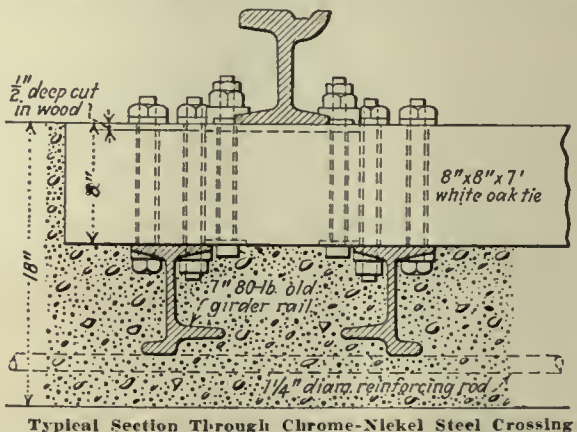
At last a trial installation of cast chrome-nickel steel was agreed upon and instructions were issued to place a crossing of this material at East Water and Wisconsin Streets. Details were prepared and patterns constructed but the question of analysis was yet undecided. Most of the existing specifications covered oil quenching and drawing of forgings, hence they were of little help because the unbalanced sections of track castings prohibited such treatment, as warping would surely result and in the treated condition straightening without cracking would be impossible. With this condition in mind and with a desire to produce a steel with good wearing qualities and high resistance to shock, it was decided to keep the nickel and chromium content somewhat higher than was specified in work that could be oil quenched. The following analysis was finally decided upon:

Element	Percentage	Element	Percentage
Carbon	0.30 to 0.40	Silicon	0.15 to 0.20
Manganese	0.90 to 1.10	Chromium	0.55 to 0.65
Phosphorus	not over 0.03	Nickel	2.20 to 2.40
Sulphur	not over 0.04		

After the castings were made, a check analysis showed the following close conformity for the analysis specified:

Element	Percentage	Element	Percentage
Carbon	0.33	Silicon	0.15
Manganese	1.00	Chromium	0.55
Phosphorus	0.025	Nickel	2.30
Sulphur	0.041		

The castings were given a single annealing treatment and no difficulty was experienced in machining them. When the castings were made proper shrink heads were not used, so that all castings contained large shrink holes located in the heavy part of the top of the section



Typical Section Through Chrome-Nickel Steel Crossing

approximately under the gage line, as well as several cracks in the base at or near the box section where the two rails intersect. Owing to the strict necessity for conserving materials at the time, the defective castings were used. The cracks were thermit welded, frogs were assembled and the joints thermit welded to form one-half of the double-track crossing. (See accompanying illustrations.) The crossing was through-bolted to a heavy timber foundation, consisting of 8-in. deep white oak ties bolted with heat-treated bolts to inverted old

7-in. 80-lb. girder rail. This type of foundation was originated by this company and is now used as standard on all heavy crossing installations. The two units thus formed were easily installed in one night. Eight 1¼-in. round rods were placed at right angles and immediately under the old rails and an 18-in. concrete slab of 1:3:5 mix was cast around this foundation, extending up to the top of the ties. The four "dummy" joints and the sixteen exterior joints were then thermit welded. The thermit welding of the joints not only saved the cost of machining and drilling for splices and



Installation of Special Trackwork at Second and Sycamore Streets



Special Trackwork at West Water Street and Grand Avenue, a Good Example of Modern Special Trackwork Design

the cost of the joint plates, but gave an absolutely smooth unbroken floor for the continuous flange bearing construction which was adopted for this crossing.

This crossing was installed in April, 1919, and similar ones properly cast, however, were placed at West Water and Sycamore Streets in May, 1919, and at Third and State Streets in October, 1919. A typical section through the crossing and a section through the foundations are shown herewith. The wide departure from previous practice and the novelty of these installations attracted considerable attention, and articles were published on this new type special work in the trade journals. From the resulting comment we realized that we had started something and made up our minds to see it through. We began to study what we had in the track and to make complete physical tests of the steel.

What the Studies Developed

Our first test bars showed a decided lack of ductility and the fracture indicated that the cast nickel structure was not completely broken up. A considerably longer period was required completely to anneal these castings than was required for carbon steel. Holding the castings in the oven at the proper temperature from four to five hours gave us the results, but still the tests showed a decided lack of uniformity. We then tried double annealing. This produced decidedly better results, and in purchasing the layout for East Water and Michigan Streets we incorporated this treatment in our specifications. At this time we began the study of air quenching and drawing, allowing the castings to cool down in the air from the annealing temperature, then heating them to the proper temperature below the critical range and allowing them to cool down with the oven. On Jan. 28, 1922, we made a physical test of six tensile specimens, two of which were double annealed, two were air quenched at 1,725 deg. F. and drawn at 1,350 deg. F. and two were air quenched at 1,725 deg. F. and drawn at 1,500 deg., which is slightly above the critical range. The results are shown in Table I.

Chemical analysis of these bars gave the following results:

Element	Percentage	Element	Percentage
Silicon	0.41	Carbon	0.40
Sulphur	0.046	Chromium	0.95
Phosphorus	0.014	Nickel	3.02
Manganese	0.76		

By comparing bars No. 11 and No. 12 with bars No. 1 and No. 2, the decided improvement in the elongation and reduction without loss of hardness is noted which indicate that the possibilities of the chromium and nickel are being better developed by this treatment. Bars Nos. 3 and 4 were made to check the critical point, which will be explained in the description of the photomicrographs of these specimens.

This treatment was continued and by lowering the drawing temperature the hardness was increased with a corresponding decrease in ductility.

The photomicrographs reproduced on page 466 were of specimens Nos. 11, 1 and 4 at 100 and 1,000 magnifications, showing as follows: No. 11 a pearlitic structure throughout; No. 1 a sorbitic structure throughout; No. 4 a structure partly sorbitic and partly pearlitic, indicating that the drawing temperature was slightly above the critical range, as stated, and that the structure obtained from quenching was breaking up and

TABLE I—RESULTS OF ANNEALING TESTS

Reference No.	11	12	1	2	3	4
Treatment	Double Annealed		Air Quenched at 1725 Deg. Drawn at 1350 Deg.		Air Quenched at 1725 Deg. Drawn at, 1500 Deg.	
Elastic limit, lb. per sq.in.	69,100	67,800	77,500	76,250	74,200	72,700
Tensile strength, lb. per sq.in.	126,600	125,100	103,450	107,300	109,350	107,450
Per cent elongation in 2 in.	12.5	10.5	20	22.5	15.5	17.5
Per cent redution in area	15.0	14.5	41	49	23.5	37
Fracture	Square	Square	¾ cup	¾ cup	Angular	¾ cup
Brinell hardness	195	180	203	195	180	187

drifting back to the pearlitic state, which is the structure of a steel cooled slowly from above the critical range. This checked our previous determinations of the lower critical point, which we found existed at a temperature of 1,492 deg. F.

In the special trackwork for East Water and Michigan Streets, which was manufactured by the Lorain Steel Company, we did not specify Brinell hardness, for our studies had not been carried to a point where

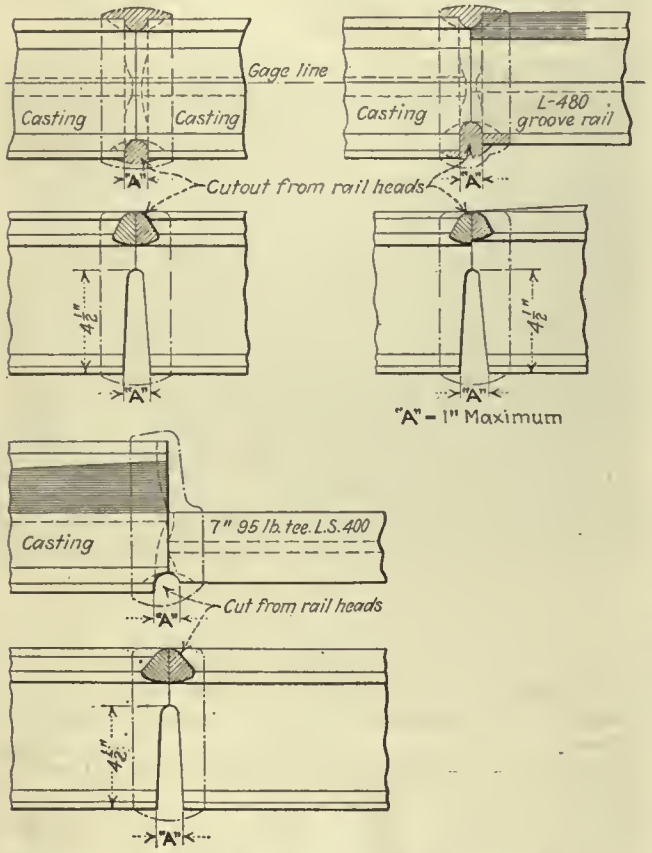


Diagram Showing How Rail Ends Are Prepared for Flange Bearing Crossings

we were certain of the low limit which could be specified. This we now know to be one of the most important factors in the life and wear of the special trackwork parts. Carefully conducted tests were made from test bars attached to the several frogs from the above layout, but as the coupons were cut off from the castings with the acetylene torch, some of the bars were so surface hardened that we were not able to turn them. From those which we were able to machine, the results shown in Tables II and III were obtained.

TABLE II—CHEMICAL ANALYSIS OF STEEL FOR EAST WATER AND MICHIGAN STREETS

	Specified Analysis	Piece No. 26 Arm No. 99	Piece No. 29 Arm No. 60	Piece No. 31 Arm No. 87
Silicon	0.25 to 0.35	0.27	0.24	0.15
Sulphur	0.05 max.	0.036	0.044	0.035
Phosphorus	0.05 max.	0.028	0.035	0.031
Manganese	0.60 to 0.80	0.78	0.78	0.61
Carbon	0.45 to 0.55	0.54	0.49	0.50
Chromium	0.60 to 0.80	0.50	0.45	0.59
Nickel	2.50 to 3.00	2.15	2.06	1.90

From Table II it will be noted that the chromium and nickel content falls below the specified analysis in all cases.

It will be noted from Table III that two of eight bars failed to meet the specifications as to elongation and reduction. This matter, together with the deficiency in chromium and nickel, was taken up with the manufacturer, who felt that the steel was of creditable quality considering that this was his "first attempt with steel annealing to these unusual requirements," and produced his own tests to verify these contentions.

Table IV contains a comparison of averages from test data furnished by the manufacturer with our own test data.

TABLE IV—COMPARISON OF DATA FROM TESTS

	Tensile	Elastic	Elongation	Reduction	Brinell
Manufacturer's tests	109,300	68,000	18.0	29.3	....
Our test on manufacturer's product	105,300	69,100	14.9	21.4	179.2
Our test on our own air-quenched and drawn specimens	105,375	76,875	21.2	45	199.0

These results seem to indicate that with our treatment we have not only obtained ultimate tensile strength equal to that of the manufacturer but have materially increased the elastic limit, elongation, reduction of area and Brinell hardness.

In the spring of 1922 it was decided to purchase the special trackwork parts for the track layouts at West Water and Grand Avenue, Second and Sycamore Streets, Reed and National Avenue and Broadway and Wisconsin Streets. Plans were prepared and specifications drawn for both solid manganese and chrome nickel steel construction. Quotations were received and when submitted to the management, instructions were issued to buy the entire lot in chrome-nickel steel, which was certainly a "vote of confidence." With these layouts installed, this new material will be given a real test. This material was inspected at the plant of the manufacturer by R. W. Hunt & Company. From their report on sixty-eight test bars from twenty-six heats the following averages were compiled:

Tensile 107,290	Elastic 66,950	Elongation 16.6	Reduction 26.4	Brinell 219
Carbon 0.49	Manganese 0.676	Silicon 0.30	Nickel 2.86	Chromium 0.837

While these results are very satisfactory, we believe still better physical qualities can be developed by suitable arrangement of air blasts to cool the castings down faster when first taken out of the annealing oven.

Wearing Qualities of Chrome-Nickel Steel

From time to time we have made depth-gage measurements of the throatways throughout the flange-bearing portions of the crossings made from various materials to determine how fast the metal was being cut down by the wheel flanges. As a fair example of our 1919 installations, it was found that it took approximately two years on the Third Street run of the Third and State Streets crossing to cut down the throatway to a point where the treads of the wheels were beginning to bear. As the original throatway depth was ⅞ in. and as the

TABLE III—PHYSICAL TESTS OF STEEL FOR EAST WATER AND MICHIGAN STREETS

	Low Lim. Specif.	26–99	7–30	20–33	24–56	25–91	6–75	31–87	22–26
Reference No.	.....	.....	.....	.....	.....	.....	.....	.....	.....
Elastic limit	60,000	67,550	70,050	70,800	73,050	68,100	68,850	69,150	69,350
Tensile strength	90,000	97,800	114,250	105,750	105,000	103,700	108,000	106,550	102,250
Elongation in 2 in.	12	16.5	11.5	13.5	4.0	13.5	14.0	8.5	18.0
Per cent reduced in area	17	25.5	16.5	23.0	5.0	17.5	16.0	9.0	30.5
Brinell hardness	.....	.....	.....	.....	.....	.....	183	183	170

Note:—First part of number indicates piece number and last part arm number. For example, 26-99 indicates piece No. 26, Arm No. 99.

height of the car-wheel flange is ¾ in. it took approximately two years to cut down ⅛ in. into this steel. From traffic studies it was found that 834,993 cars passed over this crossing each way during that period, or 278,331 cars for each ⅛ in. of wear.

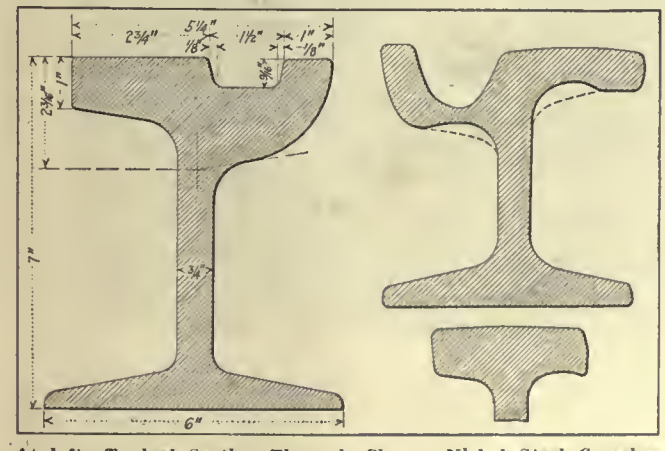
Data were obtained on the throatway wear on continuous flange bearing manganese steel crossings installed in the tracks of one of the large Middle West street railways. The throatways of the crossings were made ½ in. deep and the flanges are ⅞ in. in height. The best result obtained showed that 996,000 cars passed over the layout before simultaneous tread and flange bearing occurred, which represented a wear of ⅜ in. in the throatway, or 166,000 cars for each ⅛ in. of wear. Comparison of this figure with the 278,000 cars required for equal wear on the chrome-nickel steel crossings gives a good indication of the relative resistance to flange wear of these two types of construction.

On Oct. 10, 1921, traffic was restored to Third Street at Wells and at Grand Avenue after the installation of crossings at these locations. The crossings at Third and Wells Streets were constructed of manganese steel and the one at Third and Grand Avenue of chrome-nickel steel. These two crossings were placed on identically the same type of foundation and were subjected to the same traffic conditions on the Third Street run. Measurements taken on Oct. 3, 1922, indicate that the average depth of flangeway wear on the manganese crossing was ⅛ in. and on the chrome-nickel crossing ⅛ in. during the year. Approximately 192,000 cars passed over the Third Street run or 64,000 cars per ⅛-in. wear on the manganese and 192,000 cars per ⅛-in. wear on the chrome-nickel.

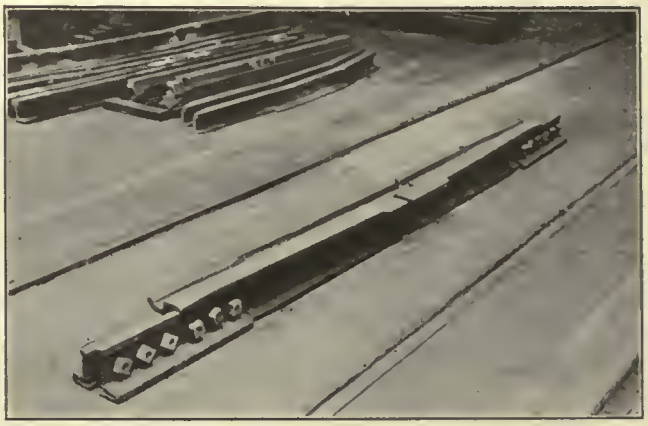
Our Experience in Welding Chrome-Nickel Steel

One of the first things we were told about our new venture was that the steel would be difficult to weld and if welded there would be doubt as to the welds being any good. However, we can now say with the utmost confidence that chrome-nickel steel of our analysis can be successfully welded. We have demonstrated beyond any doubt that this steel is not only relatively easy to weld, but when welded it can be depended upon.

As stated in the first part of this article, the crossing installed at East Water and Wisconsin Streets had large shrink holes located under the flange-bearing portion of the castings. The car wheels cut through into these shrink holes and in some instances sections were broken out. Two of these pieces over a foot in length were



At left—Typical Section Through Chrome-Nickel Steel Crossing. At right, Sections from Castings Showing How Splice Bars Wear Into Manganese Steel



Set of Bridge Shoes Cast in Chrome-Nickel Steel

completely built up with the electric welder and are still in service after about one and one-half years of heavy traffic has passed over them, with the wheel flanges riding directly on the welded portion—a severe test for any weld.

At Third and State Streets and at West Water and Sycamore Streets the flange-bearing portion has been restored by welding and no one is willing to hazard a guess as to the number of times this operation can be repeated.

The thermit welding of over 500 joints connecting together the frog ends in cast chrome-nickel steel layouts proves that this operation is also entirely successful. We have demonstrated that welds made on chrome-nickel steel by the electric and thermit processes can be depended upon when subjected to bending stresses.

As stated earlier, in 1919 we installed three double-track electric crossings of chrome-nickel steel and the following year another at Fifth and Sycamore Streets over the Chicago, North Shore & Milwaukee Railroad. In 1921 another of this type was installed at Third Street and Grand Avenue and we have just completed one more at Third and Center Streets. All of these crossings were cast in Milwaukee, machined at the Cold Spring shops and installed on the heavy bolted type of foundation which is original with this company. All joints were thermit welded.

We have installed on Second Street, at the east side of the Public Service Building, two switches and one mate of 50-ft. C. R., and, at several locations, frog center plates to replace failed manganese castings. We have made many renewal switch tongues and find that they stand up better than manganese, for the metal does not pean down nor flow under the action of the wheels. All tongues in our bolted type switches are now made of cast chrome-nickel steel.

Last winter we constructed three right-hand and three left-hand portable crossovers of 80-lb. A. S. C. E. rail in which the castings in the rail bound mates and frogs and the runoff points were made of chrome-nickel steel.

Last fall we ordered the layout for East Water and Michigan Streets and it was installed in March of this year. In February we contracted for the parts for four major layouts. One of these layouts was located at West Water and Grand Avenue, and a photograph of the completed installation is reproduced. The layout at Second and Sycamore Streets is being completed and its appearance before it was entirely paved in is shown in the illustration on page 463. The welding of all the joints in track special trackwork layouts is original

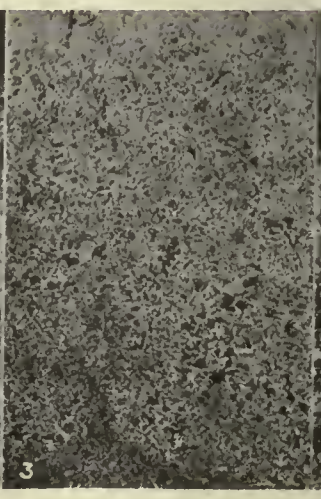
Photomicrographs of Chrome-Nickel Steel as Used in Special Trackwork by the Milwaukee Electric Railway & Light Company



No. 1. Specimen No. 11, 100 Diameters Magnification. For physical and chemical characteristics see page 463



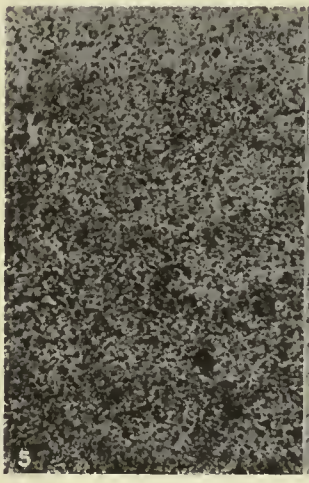
No. 2. Same, 1,000 Diameters



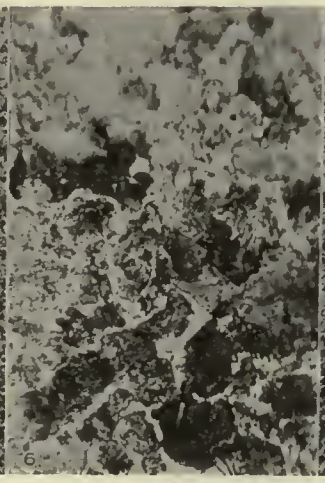
No. 3. Specimen No. 1, 100 Diameters. See page 463



No. 4. Same, 1,000 Diameters



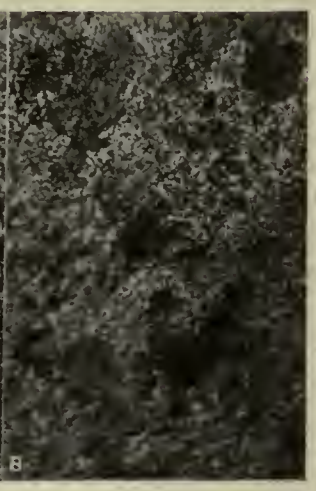
No. 5. Specimen No. 4, 100 Diameters. See page 463



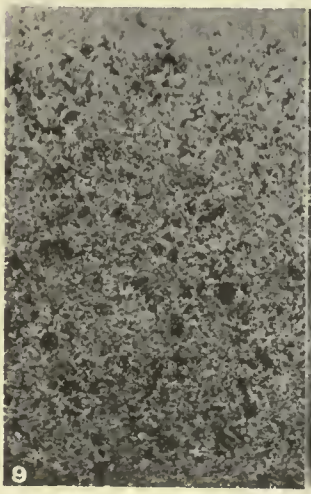
No. 6. Same, 1,000 Diameters



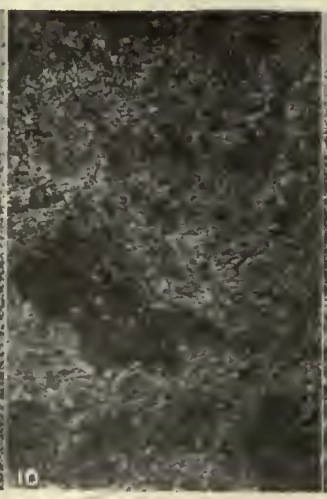
No. 7. Piece No. 31, Arm No. 87, 100 Diameters. See page 464



No. 8. Same, 1,000 Diameters

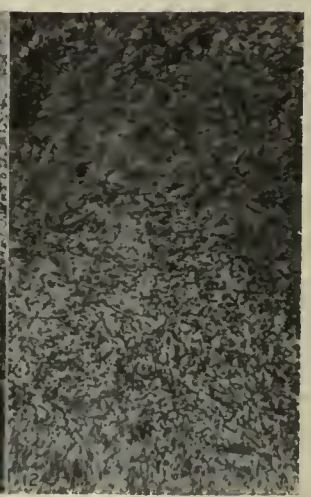


No. 9. Piece No. 26, Arm No. 99, 100 Diameters. See page 464



No. 10. Same, 1,000 Diameters





Nos. 11 and 12. Specimens from William Wharton, Jr., & Company, Inc., 1,000 Diameters.

NOTE: Specimens Nos. 11, 1 and 4 are from steel manufactured by the Milwaukee Steel Foundry Company, while Nos. 7 to 10 are for steel from the Lorain Steel Company.

with this company. It is done by the thermit process. The placing of thermit welds on manganese frog castings would completely ruin them. This is a strong point in favor of the chrome-nickel steel, as the ends of the castings do not need to be machined for joint plates as temporary splices of bar steel roughly fitted to the castings will suffice for aligning and surfacing the layout and save the cost of the expensive and painstaking machine work necessary to make a proper fitting joint, another distinctive feature of our work.

We have also installed the following bridge frogs or shoes of chrome-nickel steel:

Main Street Bridge	Kenosha	24	castings
State Street Bridge	Racine	24	castings
West Water Street Bridge	Milwaukee	24	castings
Grand Avenue Bridge	Milwaukee	24	castings
Oneida Street Bridge	Milwaukee	16	castings

We are now making up twenty-four castings for the East Water Street bridge. The castings installed are proving very successful and in time we hope to have them on all bridges. A photograph is reproduced herewith showing a set of castings for the State Street Bridge, Racine.

The bridge and building department of the City of Milwaukee praised these bridge shoes highly.

Conclusions

In 1919 we installed crossings made of chrome-nickel steel on account of the excessive cost of manganese steel and in 1922 we are paying slightly more to get chrome-nickel steel than we would be obliged to pay for manganese steel because our experience has led us to believe it is better. In analyzing the cost of the special work for West Water Street and Grand Avenue, we find what is typical of most special work layouts, that the cost is divided about as follows:

Switches, mates and frogs	35 per cent
Rails, fastenings, joints, etc.	15 per cent
Removing old work, excavation, installation, paving, etc.	50 per cent

With the switches, mates and frogs representing but 35 per cent of the total cost and as they are in a great measure the deciding factor in the life of the special trackwork, it is a matter of good judgment to install the best that money can buy, for the best will be the cheapest in the long run.

We believe that our analysis with perhaps a slightly higher chromium content should be used in preference to the analysis as offered by the manufacturers, as any effort made to cheapen this steel will only detract from its wearing qualities.

To substantiate the above statement, I will quote from Bullen's "Steel and Its Heat Treatment":

High Chromium Nickel Steels:

Chromium nickel steels containing approximately 3.5 per cent nickel and 1.5 per cent chromium comprise a type of steel with distinctive physical characteristics, but which obviously are not shown by the results of ordinary pull test values when taken in comparison with the low chromium nickel steels. The following figures, giving the ordinary physical properties, illustrate the latter point. Dependent upon the section, treatment, and carbon content (0.2 to 0.5 per cent), they may be given as follows:

Composition	Tensile Strength	Elas. Limit	Elongation	Reduction of Area
3.5 nickel .. 1.5 chrome ..	85,000 to 275,000	55,000 to 265,000	26 to 10	65 to 35
1.5 nickel .. 0.5 chrome ..	80,000 to 264,000	56,000 to 240,000	30 to 8	70 to 27.5

It is evident, since the above results show but little difference, that the superiority of the high chromium nickel steel does not appear in the static properties. On the other hand, there is a tremendous difference between the two types (in favor of the higher alloy) in the dynamic and endurance strength, such as freedom from brittleness and resistance to shock.

Or, as it has been expressed in every-day terms, the effect of the large amounts of alloys in suitable combination is like a comparison between a trained athlete and the amateur. Each man may be able to lift a maximum weight of say 200 lb. But when it comes to repeating that same feat a number of times in succession, the trained man, with his developed powers of endurance, will win every time. And thus it is with the high alloy steel.

While the ordinary tensile tests can be met by the "low-chromium nickel steel" longer life and better wearing qualities may be expected by the use of a higher percentage of these alloys. We also believe that by a double treatment the effects of chromium and nickel are better developed.

With reference to the wearing qualities we have found that chrome-nickel steel does not flow under compressive stresses as does manganese steel; that the flange-bearing portions of the special trackwork do not cut out as fast and after they are cut out can be replaced by welding. This feature alone adds considerably to the life of the layout, for in manganese work after the flange bearing is cut out, pounding begins which loosens the special pieces and ultimately destroys the foundation. Joint plates do not wear into chrome-nickel steel castings as they do into manganese steel, also switch tongues stand up better at the heel because this metal does not flow under the action of the wheels.

Joints can be thermit welded and thus do away with this troublesome feature of special trackwork and save the cost of machining to exact dimensions necessary for proper fit of joint plates.

Repairs can be made either by electric welding or thermit welding.

Chrome-nickel steel can be machined with the ordinary machine shop equipment and no special grinding machine, etc., are necessary in producing special work of this material.

Sold 50,000 Maps in Two Months

LAST July the Philadelphia Rapid Transit Company put on public sale at 10 cents a copy a map of the car routes in Philadelphia. The map measured 14 in. x 24 in., and was in colors, with each route marked with its designating number. On the back of the map is a list of places of sightseeing interest in Philadelphia as well as of the prominent department stores, banks, churches, etc., and the route number or numbers of the routes serving that building. The map was inclosed in a convenient pocket envelope, and on the back of the envelope was a list of six "trolley hikes." The maps were all sold inside of two months, and the proceeds therefrom, $5,000, was donated by the company to the employees' "Helping Hand Fund."

The company is now preparing a new edition of the map which will be put on sale in the near future, and instead of the "trolley hikes" the back of the envelope will carry a list of the principal museums and other buildings of public interest in Philadelphia, with a list of the hours they are open, conditions of admission, a summary of what is shown, etc.

C. B. Fairchild, Jr., executive assistant Philadelphia Rapid Transit Company, who supervised the issue of this map, is convinced that it is not only a great convenience to many people who would use the lines in any event, but that it cultivates travel, particularly off-peak riding and from persons who would otherwise stay at home. The second edition will be 50,000, and the proceeds derived from the sale will be devoted to the "Helping Hand Fund."

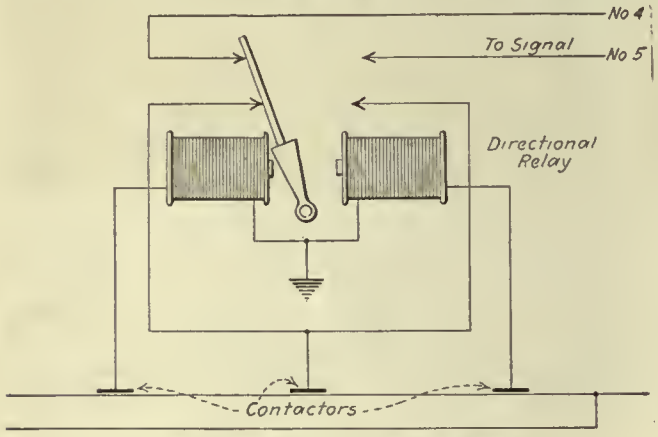
Signal Maintenance on an Oregon Railway

The Portland Railway, Light & Power Company Is Securing Excellent Results by Systematic Inspection and Repair Work—This Covers All Devices of a Warning Character Which Are Used to Protect Patrons and Expedite Operation

By H. J. Charters
Portland Railway, Light & Power Company, Portland, Ore.

THE signaling equipment on the lines of the Portland Railway, Light & Power Company, at Portland, Ore., consists of ninety-one United States Type G-1, non-car-counting block signals, 142 automatic signals for protecting spring switch points, fourteen terminal signals for stub-end city car lines, seven train-order boards, four crossing bells and two special light signals for indicating operation over bridges crossing the Willamette River.

In addition to maintaining and repairing these signals, the signal department maintains electric heaters and lights which are placed at nearly all stations on the interurban lines and at necessary points on the city lines, and in carhouses, shops, etc. There are several hundreds of these light clusters, illuminated



Circuit Diagram for Directional Relay

signs such as derail and stop signs, and special road crossing signs, which are 8 ft. long, displaying the words "Danger, Railroad Crossing" in red letters on a white background and illuminated by two series of 36-watt lamps.

It requires approximately 200 36-watt Mazda lamps per month to keep these lights in order, probably 25 per cent of these being broken or stolen by boys. General Electric tumbler snap switches, inclosed in a wooden box, with the switch handle extending through a slot in the box cover, are used at most of the stations, it being impossible to keep ordinary switches in repair due to vandals breaking them. Ten-ampere switches are used on account of their mechanical strength and an extension handle made of a discarded 600-volt 3-amp. fuse is fastened on in place of the molded one originally on the switch. In the two years that these switches have been used, not more than four or five have been broken and in these cases boxes and all were demolished.

No fixed policy of inspection is followed, but repairs are made as reports come in from various sources, as from passengers and trainmen. The trolley repair crews carry a stock of lamps and make renewals if this will not interfere with their other work.

Electric heater and light wiring in the railway buildings is inspected once a year and dangerous conditions remedied. The heaters used draw a current of 8 amp. from the trolley wire and are made in the company shops. They give very little trouble and occasion less fire risk than almost any other form of heating for the places in which they are used.

One Man Assigned to Maintenance of Signals and Lights

There is one man permanently assigned to repair and maintenance of signals and lights, but his time is so occupied with emergency repairs that any definite policy of inspection must suffer accordingly. There are two emergency trolley crews on duty, dividing the shifts from 8 a.m. to 12 p.m.; a night construction crew from 12 p.m. until 8 a.m. on the city lines, and an interurban crew of five men from 8 a.m. to 5 p.m. They make such repairs on the signals as cannot be attended to by a man operating from passenger cars and carrying the necessary material. There are telephones located at convenient points on the system from which the dispatcher can be called in case of trouble. The blocks being absolute, under the operating rules on the interurban lines, if a train finds a block signal red or yellow or fails to receive a proceed indication, the conductor must call the dispatcher and receive a verbal order to flag the block or meet an opposing train before proceeding. If the signal fails to clear when a car leaves a block, the dispatcher must be notified at the first telephone station.

Special Contactor Devised

Of the ninety-one block signals, forty-one are divided into twenty blocks, protecting 21 miles of single track on the interurban, and the remainder are on the city lines. Considerable difficulty had been experienced with the signals in operation in connection with interurban trains, which at certain locations attain a speed of around 50 m.p.h. Parts were continually being broken and movable parts bent. To obviate this, a system of contactors having no breakable parts was made, in connection with a directional relay for operating the block signals proper. The contactors consist of a timber 2 in. x 4 in. x 12 ft. in size, which is suspended in the center to the span wire and has a standard ear fastened rigidly to the trolley wire at each end. A third ear is clamped to the wire under the center of the contactor and suitable spacing provided by means of adjustable bolts, so that the tension of the trolley poles raises the wire and makes contact with a brass strip on the bottom of the timber above it. A wire leads from this strip to the directional relay. Three contacts were necessary, the first throwing the armature of the

relay to the entering position and the center one providing the impulse of current to set the signals. The third one sets the relay for the release position. The contactors are placed one span apart and at observation distance from the signal. This apparatus has decreased the troubles materially and permits operation of the trains at any speed desired.

Simple Form of Signal Repeater Proves Effective

To enable an approaching train to ascertain the aspect of a signal located around a curve, a repeater signal was arranged, consisting of a small box with 60-watt, 120-volt Mazda lamp mounted 3 in. behind a 6⅜-in. lens. The lamp was wired in multiple with the red lamp in the signal, a 550-ohm resistance tube replacing the 175-ohm one normally in the original terminal resistance. This gives an indication which can be seen at any angle of the sun or headlights regardless of whether the lens is shaded or not.

A modification of this arrangement has been used at various places, such as junction points, to indicate the approach of cars and at certain locations where it was dangerous for the motorman to look back to see if the signal cleared, as, for instance, at road crossings and station platforms. In this case the repeater was set ahead of the clearing contactor at observation distance, and faced toward the motorman. This latter arrangement is also used on all block signals on city lines where one-man cars are operated, the conductor watching the signals clear on two-man cars. These lamps last a long time usually, several having been in service since 1916 and burning twice an hour for several minutes.

An attempt is made to inspect the signals and directional relays once each month, to clean and oil moving parts, to make adjustments and to replace burned contacts, bad coils, etc. If any extended repairs are found necessary, a list is made up and the line crew assists in making them. The contactors are inspected as time permits, the line car being used for that purpose. On the city lines the original switches are in use and receive no regular inspection, being repaired or replaced when emergency repairs are made, this work being done by the trolley repair crews. Where possible these switches are being replaced by contactors of the brush type, similar to the ones used on the terminal signals.

Numerous Switch-Point Signals Are Used

The switch-point signals consist of a series of 20-watt carbon lamps located in a wooden box, behind a 6⅜-in. ruby lens, mounted approximately 15 ft. above the ground line, on a pole about 600 ft. in advance of the switch point which it protects. This gives a very clear indication and does not reflect in the rays of the headlights at night.

The line wire is brought in conduit from the nearest pole to the switch point, where it connects with a spring contact which is open when the switch is lined for the main line but closes when the switch is opened ⅜ in. or more, thus completing the circuit to the rail. The contact is of brass, mounted on a maple block which is impregnated with hot paraffin and the whole is suspended from an iron plate which rests on the ties on





At Left, Typical Signal with Pole Painted Black and White for Easy Identification. At Right, Train Order Signal

REPORT OF BLOCK SIGNALS, FROM JAN. 1, 1922, TO DEC. 31, 1922, AS COMPARED WITH TEN MONTHS OF 1921

PORTLAND RAILWAY, LIGHT & POWER COMPANY, INTERURBAN LINES

	1921 (Ten Months)	1922
Number of miles of track blocked		
Oregon City division	9 miles	9 miles
Springwater division	12 miles	12 miles
Total	21 miles	21 miles
Number of blocks		
Oregon City division	10	10
Springwater division	10	10
Total	20	20
Total number of signals	40	41
	1921	1922
Total movement of signals	843,464	991,0f2
Average movement per block	42,173	49,554
Average daily movement per block	138	141
Number of movements per failure	7,148	13,393

Analysis of failures

	1921		1922	
	No.	Per Cent	No.	Per Cent
Line wires	5	4	5	7
Switch and pole wiring	2	2	3	4
Blown fuses	7	6	3	4
Directional relay	29	25	22	30
Signal trouble	6	5	1	1
Contactors	44	38	26	35
No. 5 switch	7	6	2	3
Miscellaneous	6	5	1	1
No trouble found	11	9	11	15
Total	117	100	74	100

PORTLAND RAILWAY, LIGHT AND POWER CO.

Report of Signal Failures

AUTOMATIC BLOCK
HIGHWAY CROSSING
ELECTRIC SWITCH POINT

No._____

Reported to Dispatcher by_____ Date_____ 192_____ A.M. P.M.

Reported by Dispatcher to_____ (FOREMAN) _____ 192_____ A.M. P.M.

Trouble reported to Dispatcher_____

By_____ DISPATCHER

Trouble found_____

Repairs made (Including any details of importance)_____

Repairs Completed Date_____ 192_____ A.M. P.M.

By_____ FOREMAN

Elapsed Time of Failure

_____ Hrs. _____ Min.

Form Used in Reporting Signal Failures

either side. This, being flush with the top of the ties, offers no obstruction for trainmen to stumble over when throwing the switch.

There have been regular monthly inspections made of these signals. An extra man is detailed to this work for the four or five days necessary to complete the inspection. He uses a gasoline car to cover the territory, the signals being distributed over 70 miles of track. For the maintainer's use a testing apparatus was devised consisting of a bamboo pole 10 ft. long, provided with a hook on one end and having a porcelain receptable and 20-watt lamp mounted on it. The receptacle is connected to the hook on one side and to a spring clamp at the end of a flexible wire on the other. The switch point being normally closed, the tester is hooked over a bare spot left for the purpose on the wire leading into the conduit and the clamp is fastened to the conduit or rail. This connects the lamp on the tester in series with the lamps in the signal box and indicates whether or not the circuit is in order to that point. The switch is then opened, which closes the contact at the track, thus shutting out the lamp on the tester. This proves to be a very reliable method of testing, as the distance necessary for the switch to open before lighting the signal can be accurately observed. The operation of testing one signal consumes about one minute if the equipment is in order. If repairs are found necessary they are made at the time.

Considerable criticism has been directed at this signal due to its not giving an indication when lamps are burned out or the circuit open from other causes. Thus there is a possibility of a switch being open and no warning signal being given. However, it was felt that, as some degree of protection was necessary and as standard switch circuit controllers were out of the question on account of their high cost, these signals are satisfactory considering their cost.

The principal troubles have been due to lamps burning out, wires grounding in the conduit and contact blocks burning due to slight leakage across them during wet weather. The two latter troubles have been reduced by using double-braided wire in the conduit and by white-leading all joints in the conduit carefully and dipping the contact blocks in hot paraffin.

The trainmen have instructions to examine the switch point when they find a signal lighted to ascertain whether it is safe to proceed, and to report to the dispatcher at the first telephone reached. Section men make a visual inspection the first of every month, sending in reports of any signals found out of order.

Other Signals

The terminal signals are composed of a wooden box, containing a series of 36-watt Mazda lamps behind a ruby lens, and a relay. They are mounted on poles 100 ft. beyond the end of the double track leading to the end of the city car lines. When a car passes under the setting contactor, the signal shows red and so remains until the car has returned from the end of the line and passes under the releasing contactor. The contactors are of the brush type and give very little trouble, being cheap enough to replace when they begin to show much wear. Signals of this type are also used at special locations to indicate approaching cars. They are included in the regular inspection trips covering other signals.

The train-order signals are located at interurban stations where an operator is maintained. They are provided with a semaphore arm for notifying trains to receive train orders. This arm actuates a movable ground connection on a series of lamps which show green or red at the top of the pole and in the operator's room according to the position of the semaphore. The end of the semaphore is counter-weighted and takes the stop position when a cable is released in the station. The cable and lighting wires are brought through conduit drained to a gravel sump hole to prevent accumulation of water and consequent freezing during cold weather. No special inspection is made of these signals except for overhauling and repainting as they are constantly under the attention of the operator on duty. Failure reports are made by telephone and relayed to the repair crews.

Three of the crossing bells are of United States manufacture and one is of the motor-driven wigwag type. These are inspected at the same time as the other signals.

This company inclines to the use of illuminated signs suspended over the road at heavily traveled points. A series of six lamps is used in each of these signs and maintenance is reduced to a minimum, it being only necessary to renew the lamps at infrequent intervals.

New Report Form Devised

In 1921 the state public service commission required all railroads to furnish monthly reports covering all failures of automatic warning devices at highway crossings, the reports to show in each case the location, time and duration of each failure and also any pertinent details concerning it. In order to collect such information and also have a record of block and switch signal performance, which had been discontinued during the

war, a report sheet was prepared having suitable spaces for the date, location, by whom reported, to whom referred, trouble reported, trouble found, repairs made, time "O.K." and elapsed time of the failure. Upon the dispatcher receiving a report of failure, he makes out one of these sheets, numbered serially for easy checking, and forwards one copy to the signal department for entry of repairs, time, etc., and the duplicate to the office for checking reports. Maintenance men are also instructed to fill out a report sheet for any failures they discover and repair without a report from the dispatcher. These reports are consolidated monthly and yearly, giving a good record of signal performance during the period. No reports are made out for the city lines, excepting those on crossing bells, with the exception of such reports as can be made up from the dispatchers' daily record of railway line trouble. This report merely shows the percentage of total trouble chargeable to the signals.

In the reports of signal operation for 1921 and 1922, a movement was counted every time a car passed under a contactor and, in computing the total movements, only the minimum number of trains was taken into consideration, there being several extra trains each day which were not included. It should be noted that the number of movements per failure during the ten months of 1921, for which the report was made, were only about 50 per cent of the movements during 1922. This would indicate direct results from resuming special repair and maintenance work which had been almost altogether dispensed with for several years. Under the head of line wires were included all the troubles emanating from that source, whether the circuits were open, crossed with themselves or crossed with other wires. Blown fuses resulted mostly from lightning storms and were not counted if they resulted from crossed or grounded wires or similar causes. Directional relay and contactor trouble caused a large part of the failures but were much less numerous than a number of years ago when the old style trolley switch was used. To signal trouble were charged all failures resulting from the signal mechanism; while never at any time very great, this trouble has decreased 20 per cent, there having been only one case during 1922. This speaks very well for the signals in view of the fact that they have been installed for over ten years.

Maintaining Dielectric Strength of Transformer Oil

Dehydration by Centrifugal Separator Is Proving Successful—The Advantages of This Practice Are Speed and Economy—Apparatus May Be Used for Purification of Lubricating Oil Also

THE danger resulting from even a very small proportion of water in transformer oil is well known to every electric railway power man. It is necessary constantly to be on the job, not only to prevent, if possible, the entrance of moisture, but also to effect its removal before a quantity sufficient to endanger the insulation has accumulated. Experiments conducted during the past three years by a large Eastern electric railway have demonstrated that the method of separation by centrifugal force can be successfully applied to the problem of removing water from transformer oil, as well as to the work of reclaiming oil used for lubrication purposes in the power house.

In railway service the load on a transformer varies widely and rapidly, with a consequent change of temperature of the apparatus and an accentuation of the "breathing" phenomenon. If the atmosphere is laden with moisture it is difficult to prevent the entrance of water when the machine cools and outside air is drawn in. Recent improvements have been helpful in reducing the amount of water in transformer oil. The chloride of lime breather, if carefully watched, operates satisfactorily to dry the air that is drawn into the case. Some new transformers of large size have a nitrogen breathing apparatus, which removes the oxygen of the entering air and leaves only the nitrogen within the transformer. Still other schemes have been tried with varying success. However, there are a very great number of transformers built before the development of these devices, but still perfectly capable of giving good service. The question of removing water from the oil therefore remains today, and will remain for a long time to come, an important problem for the electric railway industry.

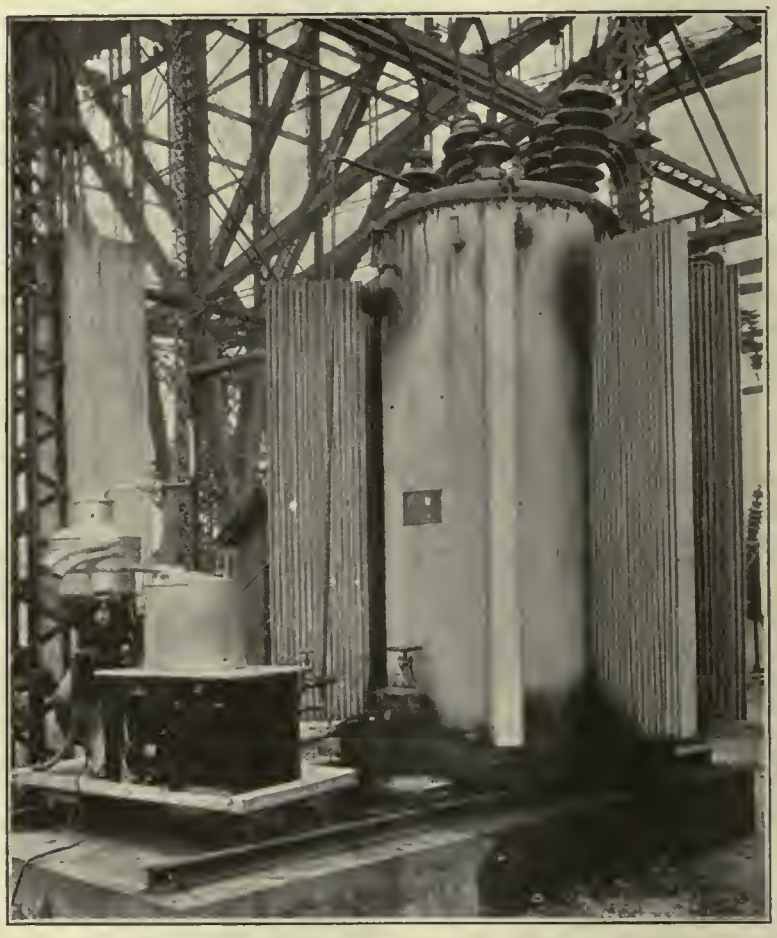
A filter press is the method most widely used at the present time for removing water from transformer oil, but centrifugal dehydration has proved very successful where it has been tried. The earliest known application of this principle to such work is found in the ancient Chinese practice of separating fruit juices from a mixture by placing them in a gourd and whirling it rapidly around in a circle at the end of a rope. Our modern cream separator works on a similar theory, and some years ago the same method was first tried for the purpose of reclaiming used lubricating oil. The extensive use of centrifugal oil purifiers by the Navy during the war brought them widely into favor.

Soon after the successful adaptation of this principle to the problem of purification of lubricating oil, experiments were begun at the laboratory of this same Eastern electric railway company to determine whether or not the same method could be successfully followed for the reclamation of transformer and switch oils. It had already been established that the centrifugal purifier was highly efficient in the removal of the small particles of solid matter found in used lubricating oil, and that it removed also a large part of the water from the oil in the process. The problem of purification of transformer oil, however, is somewhat different. There is likely to be very little solid matter to be removed, but the elimination of moisture is of vastly greater importance. The reclamation of switch oil is largely a question of the removal of carbon.

It was found that the centrifugal separator then in

use for purifying turbine oil was not altogether satisfactory when used for dehydrating transformer oil. Too much water remained in the oil even after repeated treatments, and the dielectric strength was therefore not up to standard. A slight modification of the design of the bowl was accordingly made by the manufacturers, the De Laval Separator Company. After repeated trials and changes in the design, a model was developed which gave satisfactory results when used on even the worst transformer oils. With this machine it has been found possible to restore the original dielectric strength of the oil by putting it through the separator only once.

As an illustration of a typical experiment in dehydration of transformer oil, a test made by the electric railway company Oct. 17, 1922, may be cited. The transformer used was a 625-kva. unit, 2,300-4,400 volts, containing No. 12 transil oil. The temperature varied between 42 and 48 deg., Centigrade, during the test. Approximately 530 gal. of oil were run through the separator, at a rate of 50 to 150 gal. per hour. This speed could have been exceeded except for local conditions, a rate as high as 350 gal. an hour having been obtained in other of these tests. The dielectric strength of the oil was determined in each case by averaging the breakdown value obtained by testing five samples of oil in an oil test cup with ½-in. electrodes, 0.2 in. apart. The transformer was not in service at the time.



Transformer with Portable Oil Separator Connected

TRANSFORMER OIL TEST

Time	Dielectric Value of Oil at Intake	Dielectric Value of Oil at Outlet
8.15 a.m.	14,000 volts	21,000 volts*
8.30 a.m.	First oil repeated	40,000 volts
8.45 a.m.	29,000 volts	42,000 volts
9.30 a.m.	45,000 volts	48,000 volts
9.45 a.m.	46,000 volts	**
10.15 a.m.	49,000 volts	**
10.45 a.m.	50,000 volts	**
11.30 a.m.	49,000 volts	**
12.30 a.m.	51,000 volts	**

* This oil was not considered fit to be returned to transformer and was put through separator again.
** No breakdown values obtained—dielectric above 52,000 volts capacity of testing machine.

In similar tests using the "new" gap with 1-in. electrodes 0.1 in. apart, dielectric values as high as 32,000 volts have been obtained.

The apparatus now used for the dehydration of transformer oil is largely the outgrowth of experiments during the last three years. It consists of a motor-driven centrifugal separator, together with an electric driving motor, pumps, heater and oil tank, all mounted upon a movable platform. The separator itself differs only in the design of the bowl from the machine which was described in the ELECTRIC RAILWAY JOURNAL, issue of Nov. 18, 1922, and which is now quite widely known.

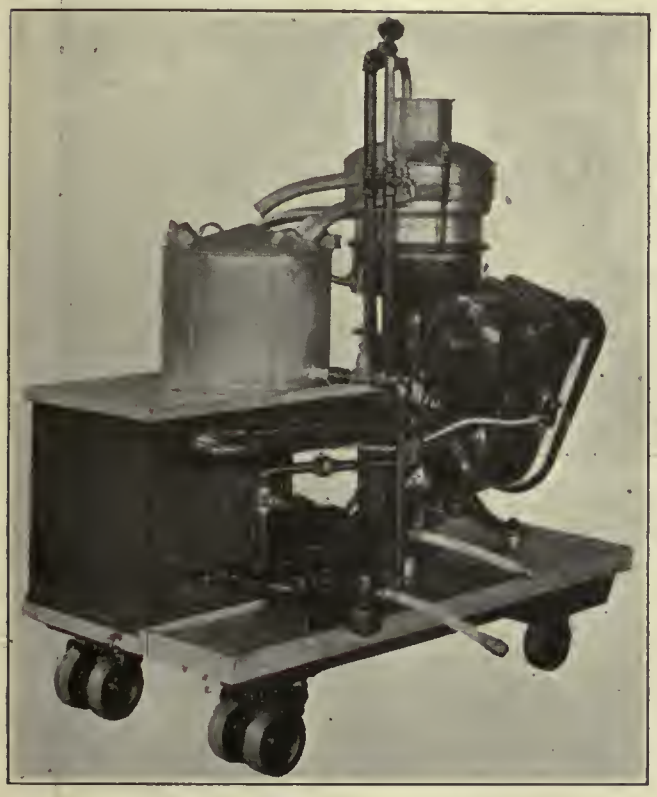
The action which takes place in the separator bowl is the same as that which occurs in the purifier bowl except that in the latter the water is forced upward along the outer edges of the disks and is discharged through an outlet at the top, while in the former, the comparatively small quantity of water is allowed to remain in the dirt pockets. The fact that the apparatus is portable makes it possible to move it easily from one location in the power house to another, or to roll it up a gangway onto a motor truck and carry it to various substations. At a large generating station it can remain permanently piped to all of the transformers and be used solely for their dehydration, but where there are not a sufficient number of units to keep one separator busy all the time, the portability feature is a great asset.

The frequency with which it may be necessary to dehydrate transformer oil of course depends upon many factors. An outdoor transformer in a damp climate may acquire a dangerous amount of moisture in the oil in four or five months, while another located indoors may safely go for years without being touched. The practice of the electric railway in question is to draw off a sample of oil from the bottom of each transformer once a month and send it to their laboratory for testing. In this testing the old gap is habitually used because it is thought to give more reliable results. When the dielectric value of the sample of oil falls below 26,000 volts, the transformer is dehydrated by the centrifugal separator.

The advantages which have been found to result from the use of the centrifugal separator for dehydrating transformer oil have been, primarily, increased speed and decreased cost. It was usually necessary with the blotter press to run the oil through the filter at least three times in order thoroughly to purify it. A big transformer may contain as much as 2,400 gal. of oil, which would mean a matter of forty-eight hours for dehydration by a medium-sized filter. Additional time would be required for changing blotters, taking apart

and putting together the apparatus. On the other hand, a centrifugal separator could probably purify that quantity of oil in about twelve hours.

Not only is it possible for fewer men and fewer machines to do the work by the new method, but there is also the additional advantage that it is frequently possible to take a transformer out of service for a short period for dehydration, when it might be quite impossible to keep it out for many hours. The centrifugal



Portable Separator for Reclaiming Transformer Oil

separator, therefore, makes it feasible at times completely to dehydrate the oil under circumstances such that it could not be done by the slower filter press. With the latter it would be necessary to do the job a little at a time whenever it was possible to take the unit out of service. Other advantages are that the separator is less influenced by atmospheric conditions, and that the messy process of changing blotters is eliminated.

An illustration of the usefulness of speedy dehydration is furnished by an experience which the electric railway had with a transformer at one of its substations. It was discovered that a small pinhole leak in the copper tubing was allowing a minute quantity of water to mingle with the oil. Although the rate of leakage was low, nevertheless the dielectric value of the oil was rapidly reduced. It was most important that the transformer remain in service, so a portable centrifugal separator was brought over and set to work while the transformer remained alive. After the oil had been dehydrated once the separator was left in place, and tests were taken of the oil every hour. Whenever the dielectric value fell below 30,000 volts, the purifier was set to work to restore it to the vicinity of 50,000 volts. In this way it was possible to keep the transformer in service for several days in spite of the leak, at a time of peak demand when the loss of any apparatus would have been a serious inconvenience.

It may be doubted, however, whether under ordinary circumstances it is desirable to treat transformer oil while the unit is in service. Sometimes when there is much moisture in the oil, it is not fit to be returned after one passage through the separator. The flow of oil in and out, and the disturbance of small particles of solid matter, to some extent increases the risk of a breakdown. Manufacturers of transformers disapprove the practice, and operating men are inclined to agree with them. In railway service it should be possible to take the unit off the line long enough to dehydrate the oil.

The existence of some solid matter in the transformer oil is clearly shown whenever the centrifugal separator is cleaned. A kind of sludge somewhat resembling vaseline is found to have gathered in the dirt pockets. This is probably composed of metallic particles from the terminals, ingredients of the insulating varnish and so forth. The sludge accumulates so slowly, however, that it is possible completely to treat a transformer without it being necessary to stop the separator for cleaning. In this respect the centrifugal separator possesses a distinct advantage over the press filter, whose blotters have to be frequently renewed. The time required for taking apart the machine, cleaning out the dirt pockets, and putting it together again is about forty-five minutes.

There are now several installations of this type of apparatus in use for dehydration of transformer oil. The blotter press method has not been entirely abandoned, because it is thought to be superior for removal of some foreign substances, such as the carbon in switch oils. Therefore apparatus for both methods is kept available, and its use is governed by the circumstances of a particular case. The same equipment has at times been used for purification of lubricating oil and dehydration of transformer oil, although this is not ordinarily done because the size of the plants justifies separate installations. On a smaller property, however, it would be possible to use one separator for both purposes by simply changing from a separator bowl to a purifier bowl, or vice versa. Carbon has been successfully removed from switch oil by washing with soap, allowing the mixture to settle, and then dehydrating the oil. By this process the dielectric value of the oil was brought back to standard and its clearness restored.

The utility of the centrifugal separator in electric railway work is perhaps greater than in most other work involving large transformers, because it is nearly always possible for a railway to take a transformer out of service for a few hours any day. Where the unit must remain alive during dehydration, there is a possibility that the first oil coming through the separator will not be fit to be returned, and if it should be poured back into the case, a breakdown might result. If, however, the oil in the transformer be of fairly high dielectric strength to begin with, or if the unit be dead during the dehydration, this danger will be avoided. It should then be possible to utilize the centrifugal separator readily, and to accomplish improved speed and reduced costs in the removal of moisture from transformer oils. The fact that the same machine can be used after a slight change, for the purpose of purifying lubricating oil, brings it within the reach of smaller companies as well as those which use power on a large scale.

Two Comparatively New Electric Railway Machine Shops





A contrast in what individual motor drive or the lack of it (above) means in securing a clear overhead sweep for cranes, hoists and derricks, good appearance and better working conditions for the men. Belting not only clutters up the headroom, but incurs considerable expense in maintaining belts and shafting, and the machine work is not done as positively and economically.

Individual Motor Drive Improves Shop Efficiency

The Intelligent Application of Electric Motors to Machine Tools May Be Used to Increase Shop Output, Save Power and Improve the Quality of the Work—Some Examples of Specific Application to Machines Are Given

By H. J. Rice
Machine Tool Specialist, New York, N. Y.



Two Boring Mills, One Equipped for Individual Drive and the Other for Group Drive

WHERE precision, efficiency and rapidity of production are of first importance small wonder that individual motor drive for machine tools is fast replacing the old system of transmitting power by line shafting. This is as true of the modern electric railway shop as in other lines of industry.

Briefly, individual motor drive involves the use of a motor with independent control equipment for each separate machine tool, as compared with the operation of several tools by the same motor. It is difficult to outline all the advantages of individual motor drive, but a few of the principal ones follow:

1. *Increased Production.*—This may come from various causes. Due to the variety of machine tools on the market today and the adaptability of some of them to certain types of motors and control equipments, an appreciable increase in capacity may be obtained. The use of adjustable or multi-speed motors may result in considerable saving of time in effecting speed changes, as compared with mechanical means, such as cone pulleys or gears. Simple controllers or push buttons can be placed convenient to the hand of the operator, who then can observe his work more closely.

2. *Power Saving.*—With line-shaft drive a considerable amount of shafting and belting must be turned over, and seldom indeed is it possible to avoid "idling" a large proportion of the driven machines. The friction loss in line shafting and counter shafting frequently takes a considerable share of the total power. In laying out such drives it is necessary to install a motor of ample capacity to take care of all the machines that may be run at once. The motor must operate much of the time at greatly reduced loads, with decreased efficiency. As an illustration a standard 75-hp. d.c. motor has a full-load efficiency of approximately 91 per cent; at half load the same motor has an efficiency of 87 per cent; and at one-quarter load it becomes about 79 per cent. With a.c. motors the drop in efficiency from full load to one-half or one-quarter load would be even greater, for we have then to consider the poorer power factor. Wherever such operating conditions obtain—and in the average electric railway shop half the machines may be idle momentarily—the installation of individual motors so that the power may be cut off the instant the machine becomes inoperative should result in a power saving of 10 to 50 per cent or more.

3. *Elimination of Belt Slippage.*—Often considerable trouble is experienced with slipping belts, and with deep cuts the allowable size of belt and pulley may not transmit the required power satisfactorily. Mounting the motor on or near the machine frame with positive gear drive will remove this trouble.

4. *Shop Improvements.* — Elimination of shafting, belting and fixtures improves light and ventilation and reduces the amount of dirt, grease, noise, fire and accident risk. Clear overhead space often is a requisite for traveling cranes.

5. *Extensions and Alterations.*—These may be made at the least expense, each machine with its own motor being independent. Trouble at one machine does not necessitate shutting down others.

6. *Power Tests.*—Individual drive lends itself to accurate tests of power consumption. From a few readings faults in the machine tool itself easily may be detected and corrected. More accurate data may be furnished the accountant for fixing factory costs.

References have been made to the increased production capacity of labor, plant or machinery by individual drive. Output may be increased from 5 to 10 per cent by the introduction of electric drive in its simpler form, while with machine tools highly responsive to automatic control production may be increased 50 per cent or more.

The value of adjustable-speed motors in improving output is well illustrated by actual tests taken on a 72-in. lathe. The first test was made on a lathe having standard cone pulleys. Beginning on the first cone at a cutting speed of 66 ft. per minute the speed fell gradually for forty-one minutes, at the end of which time a speed of 33 ft. per minute was reached. The belt was then shifted to the second cone, giving an initial speed of 55 ft. per minute, which decreased in the next eleven minutes to 31 ft. per minute. The belt was again shifted to the third cone and the cut completed in seven minutes, the speed falling from an initial value of 48 ft. per minute to a final value of 15 ft. per minute.

The test on a similar lathe driven by an adjustable-speed d.c. motor with field control was carried out at a practically constant speed of 85 ft. per minute, the range being between 84 and 87 ft. per minute. The belt-driven lathe required fifty-nine minutes to complete the work, while the motor-driven one performed the same work in thirty-one minutes. With the electrically driven tool the cut began and ended at the maximum cutting speed that the work permits, a condition indispensable, as a rule, to rapid production. It should also be pointed out that with electric control the operator has only to watch the tool and increase the speed from time to time up to the permissible temperature of the tool and the safe working strength of tool carriage and lathe headstock.

Possibly one of the most interesting of all individual drives is that applied to the reversing planer. In the ordinary planer the work is clamped to the platen and moves back and forth under the cutting tool. the cut being taken in one direction of travel only. The speed maintained during the cutting stroke is comparatively slow, but is automatically increased on the return. Different materials, rough or finishing cuts, etc., impose various conditions. With motor drive, adjustments may be made within any desired limits of both cutting and return speeds. The motor speed while cutting may be set between, say, 250 and 500 r.p.m., and while returning a speed of 500 to 1,000 r.p.m. may be used. The motor is geared direct to the bull gear in the planer and its armature is reversed with each reversal of the planer platen. Dynamic braking is employed in effecting reversals tending to form a cushion effect in stopping the platen, thus reducing damage to the machine parts by these sudden impacts.

Similar reversing-duty equipments are now manufactured in standard sizes, and designed especially for boring mills, plate planers, slotters and wheel lathes. In the latter equipment frequent use is made of a "slow" push button which cuts in armature resistance to give approximately 50 per cent speed reduction, thus providing for cutting through hard spots on the tires of driving or car wheels.

Obviously these results could not be accomplished with the induction motor, for it is not satisfactory as a variable-speed machine. In many shops where a.c. power only is available, and where the automatic features of d.c. motors are desirable, necessary current is obtained from motor-generator sets. Induction motors will give fair satisfaction, however, and may be used where there is not enough use to justify the motor-generator installation.

The question may be asked whether individual drive has any place in the more or less isolated interurban shop where only 600-volt d.c. is available. Why not? Motors for 550 volts are now built in standard sizes from ½ hp. to 200 hp. and in the larger capacities are less expensive than the 230-volt machines. As previously pointed out, the d.c. machine possesses the inherent characteristics desirable for flexibility. The Harvard Shops of the Cleveland Railway, considered by many an ideal example of modern practice, employ 550 volts for power. Individual motor drive is used almost exclusively throughout the plant, whose average monthly consumption is 21,000 kw.-hr. Many other large shops also have abandoned line-shaft drive.

Great care should be used in selecting the proper type and size motor for each kind of machine tool. To give the characteristics of each machine here would be impracticable, but a summary of the different classes of work with the corresponding type motor follows:

D.c. shunt-wound or a.c. squirrel-cage motors are suitable where constant speed is desired and starting duty is not excessive, also when considerable speed range is desired. For the latter purpose the shunt-wound d.c. motor only is suitable. Machine tools in this classification include bolt cutters, boring machines, chucking machines, drilling machines and radial drills, grinders, gear cutters, lathes, pipe cutters, rotary planers, reversing motor planers, circular saws, shapers, slotters, and tappers.

D.c. compound-wound or a.c. squirrel-cage motors with high-resistance rotors are used for constant speed work but with heavy starting duty, or where there are sudden heavy loads of short duration. Machines in this class are bolt and rivet headers, bending machines, drop hammers, shears, and swagers. For these machines compounding of 20 to 40 per cent is used. Bending rolls and lathe carriages require 50 per cent compounding. Belt-reversing planers and friction saws use 20 per cent compounding.

D.c. series motors are useful to give excessive starting torque when speed regulation is unimportant, and then only if light-load speeds do not exceed the safe limit. This type is sometimes used for lathe carriages.

A.c. slip-ring motors are needed for heavy duty where some speed adjustment is called for. These motors do not have the characteristics of d.c. adjustable-speed motors, but are comparable with d.c. motors with armature control. Bending rolls use motors of this type.

A.c. multi-speed motors are used where d.c. is not available and when two or more definite speeds are desired.

Automatic Substation Experience in Cleveland—III*

Remote Supervisory Control Gives Advantages of Manual Plus Automatic Operation — Experience with Existing Substations Has Made Possible Designs for Future Ones in Which Floor Space Will Be 30 per Cent, Cubic Contents 60 per Cent and Cost 40 per Cent Less than in Present Structure

By L. D. Bale
Superintendent of Substations the Cleveland Railway

IN PRECEDING articles the present three automatic substations operating in Cleveland were described and details of the sequence of operations in the automatic control were given. Mention was made of the remote control and load indication which are now being installed. The principles of this are given in the following article:

Remote Supervisory Control and Load Indication

Aside from the necessity of perfecting a system wherein absolute control of the individual faulty feeder section was obtained, it was realized that, with the adoption of comparatively small substation units, ability to shift or transfer load in the event of station or system zone trouble was imperative, especially where the demand for continuity of power supply was insistent. If means were not available for the control of transfer of load where the plants are in relatively close proximity and are connected through d.c. feeder network of low ohmic resistance, trouble occurring in one station or zone might readily be reflected to an adjacent plant, possibly producing sufficient overload in that plant to involve it in the trouble, and in this manner actually spreading the disruption to service over the system.

Taking advantage of the presence of the remote supervisory control system proposed for d.c. feeders, minor additions were made, making the control applicable to the converter. By utilizing this method, not only is indication had of the condition of the converter at all times, but also a much higher over-all plant efficiency may be obtained through the ability to start and stop equipment at will. This will simulate manually operated conditions, with the added advantage of much greater system flexibility.

The system of remote supervisory control and power indication, as being installed, will be centered in a dispatcher's office located approximately at the geographical center of the system. From this office will be extended two pairs of telephone conductors to each automatic substation. Each substation will be represented on the dispatcher's desk by a small panel, upon which will be located signal lamps for indicating the position of the various d.c. feeder contactors and certain master relays, or controlling devices, at the substation end. The remote control of equipment in the substation is accomplished by the manipulation of a keyset located on the dispatcher's table, consisting of about thirty-three keys or buttons similar in appearance to those used on adding machines. Through codes set up by the keyset, certain combinations are transmitted that cause control devices at the substation end to be operated. As these devices are operated, indication is had by the change of signals in the lamp monitor at the dispatcher's office. Further, the automatic functioning of any device at the substation end, that is, any operation independent of the action of the dispatcher, will also set up corresponding signals at the dispatcher's board. To aid in comprehensive load dispatching, provisions are made for duplicating, in the dispatching center, the loading of each station upon a graphic chart.

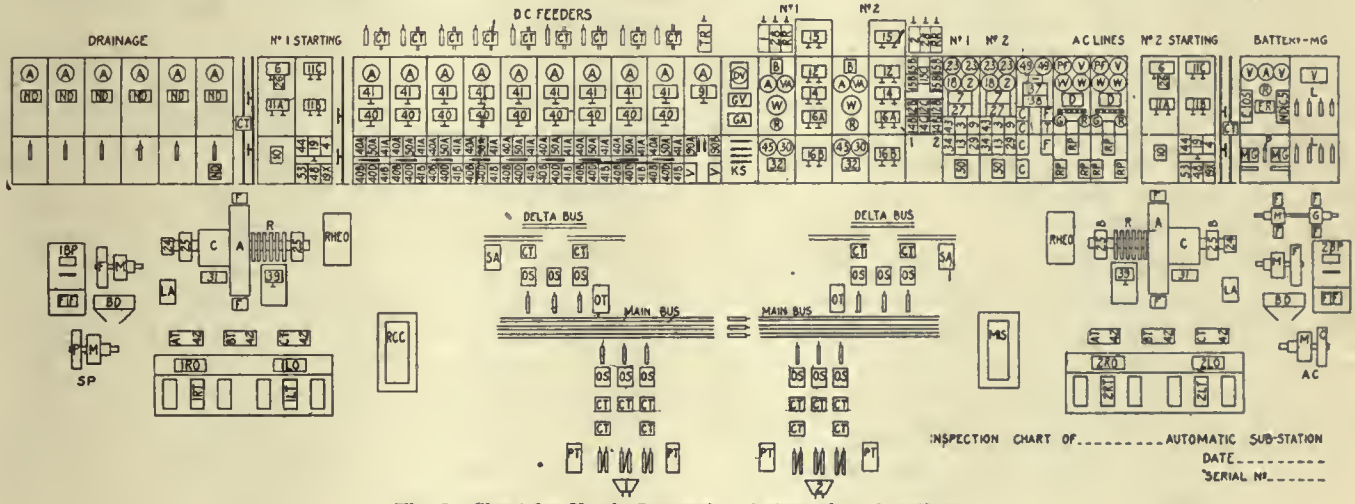


Fig. 8—Chart for Use in Inspecting Automatic Substations

*See issues of this paper for March 3, page 359, and March 10, page 405.

The pairs of telephone conductors are also used for telephone communication between the dispatcher and the substation inspector. It must be understood that the remote control system does not supersede the automatic substation control in any sense, all the various benefits derived from full automatic control still remaining. In the event of the remote control system becoming inoperative for any reason whatsoever, it is automatically disconnected from the substation control, leaving the station under full automatic control.

The dispatcher's desk is at present arranged to accommodate fifteen automatic stations. In laying out the control system an ultimate capacity of thirty substations has been contemplated. With thirty automatic substations in operation, which would mean that the entire power facilities of the system would in all probability be automatized, through the use of thirty or forty buttons in the one keyset the dispatcher would have absolute control of every converter and d.c. feeder on the entire system.

Operating Experience With the Existing Three Substations

Prior to the starting of the first plant, there was doubt expressed in some quarters as to whether a converter automatically controlled could be successfully ap-

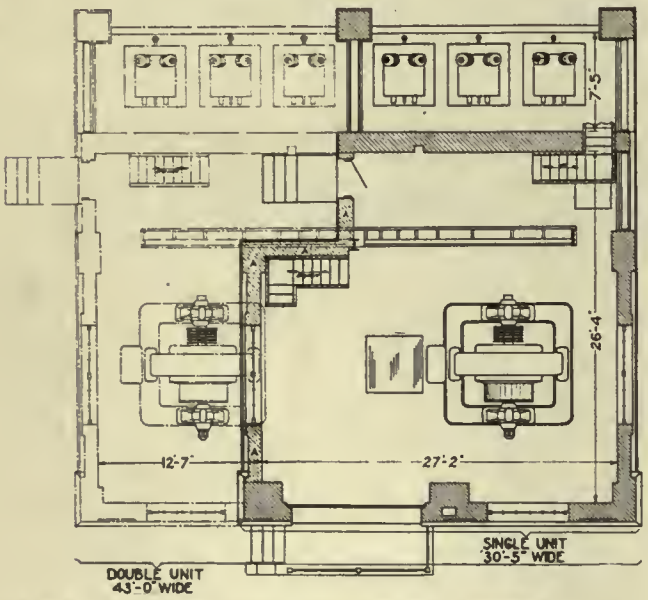


Fig. 9—Floor Plan of Proposed Automatic Substation. Single-Unit Type in Solid Lines, Extension to Accommodate Two Units in Broken Lines

plied to a system where the requirements were such as they are in Cleveland. This feeling probably was fostered by lack of precedent, in addition to the fact that many new phases of operation were presented in the adoption of this type of control that had not been encountered in automatic substation applications then in operation. Among the most important of these problems are: The matter of control of the larger capacity converters; complications arising affecting not only feeder control, but also involving the converters, due to the presence of tie copper and feeder network; reliability of operation under emergency conditions, etc.

After observation of the performance of the first automatic plant put into operation on this system, the question of the feasibility of automatically controlled substations for urban service was definitely answered. Regardless of difficulties encountered in the initial installation, there remained no doubt but that the principle was fundamentally correct. Such difficulties as were experienced were not inherent defects in this type of station, but rather a matter of control details.

The existence of the first installation in operation made it possible, by the process of elimination in some cases, to rectify defects in the scheme that were apparent, and, through special tests and experiments, to uncover other hidden deficiencies in the control. Thus, by intensive study of the problem, together with observation and verification of results obtained in actual service operation, the plants were finally brought to a point where the operating record was perfect. This refers, of course, to the converter control.

The d.c. feeder control, as previously pointed out, while being satisfactory in its operation when applied to most systems, it is not so in this instance, by reason of the rather unusual requirements on this property regarding power supply. With the completion of the installation of remote supervisory control and feeder transfer system, the complete control of the d.c. feeders in automatic plants will also be assured.

It has been found that automatized substations in urban work, as has been proved to be the case in interurban work, are conducive to a higher degree of reliability of service than manually operated plants. Not only are the mistakes in operation (generally resulting in interrupted service) eliminated, but service is restored with the greatest possible expedition in the event of a contingency involving possibly the entire system, such as a.c. power failure.

By check upon present manual plants on this system it has been found that it requires an average of one and one-half minutes for an operator to place a 1,500-kw. converter in operation from a standstill, under normal conditions. In the event of trouble, where switching is required on feeder sections, and where it is necessary, in preparing to restart, to clear buses, switch control, converters, etc., after an outage, an average of five and one-half minutes elapses from the time of origination of the trouble until the plant is again in full operation with all feeders on the converter bus. In automatic operation the same type of 1,500 kw. converter is started from a standstill and connected with the load in thirty-three seconds, provided there is no time consumed in field reversals. This takes approximately five seconds per reversal. With this speed of operation in mind, it may be assumed, provided a.c. power is available, that approximately thirty-five seconds will represent the limit of time of d.c. power interruption with this type of station in service. This point has been demonstrated on the property upon several occasions, in all of which the d.c. power supply was again established before the operators of the manual plants had the opportunity to clear their boards ready for restarting. With the automatic converter capacity at present installed, representing but 11.8 per cent of the total system capacity, it is realized, of course, that, in the event of a.c. power failure under peak-load conditions, the voltage from existing automatic plants will be so reduced by introduction of current-limiting resistance and feeder drop that the effect will not be felt appreciably over the entire system. However, during off-peak periods this is not the case.

With automatic control, the item of maintenance will be lower than that incident to manual operation, especially where the plants are subjected to an appreciable amount of trouble due to system disturbances. The possibility of an operator anticipating trouble is re-

mote, for abnormal conditions develop so quickly and are frequently so obscure, that, before he has the opportunity to realize what is occurring, damage to equipment often results. Mistakes in operation are also conducive to further damage.

Because the method of control includes protective devices peculiar to automatic operation the equipment is protected as the trouble occurs. The effects of short circuits, of sufficient value to cause the converter to "flash over," are so minimized that no damage to the control results, and that to the converter is so slight as to be practically negligible. In the several cases of "flash-over" observed during the operation of the plants under discussion, there has been but one which interfered with service. In this instance the converter was removed from service due to operation of a.c. overload relays, and was back in operation again in forty seconds (the time required for automatic starting), no damage being done to any of the equipment. In other cases the converters were not disconnected from the d.c. bus.

In regard to the cost of maintenance, unsettled operating conditions due to the many tests and experiments conducted, and the work of making various changes necessary in the stations, have made it impossible to obtain dependable figures on maintenance cost. However, the amount of data so far collected indicates an approximate 25 per cent decrease as compared with manual cost, figured upon a unit, or converter, basis.

When the installation of automatic control was first contemplated it was realized that the success or failure of the installation would depend primarily upon proper inspection and maintenance. With this in mind, particular attention was given to the training of inspectors. A school was organized and to this were invited certain men in the organization who possessed the required qualifications for this training. They were engaged at that time in maintenance work and had had experience in operating substations. Intensive study was made, utilizing specially prepared wiring diagrams and charts; questions were asked; and all the possible contingencies that could be foreseen were discussed, until finally, everyone attending these classes became perfectly familiar with the scheme of operation.

Incidental to the training of inspectors, the discussions were, in a number of instances, responsible for the uncovering of weaknesses or deficiencies in the proposed control scheme. These were corrected in most cases before the control was assembled. The fact that the equipment for these automatic plants was installed by the railway company made it possible to have the trained men conduct all circuit check tests necessary during the construction periods. When the plants were ready for operation they assisted the company's engineers in all tests incidental to placing the equipment in full operation. The experience gained during this period was, without doubt, equivalent to at least three or four years of normal automatic inspection work. Since the plants have been in operation many valuable suggestions have been received from the inspectors regarding matters of control, etc.

In addition to a main wiring diagram of the entire plant, a loose-leaf book of individual devices is maintained at each substation. A separate page is devoted to each relay, contactor, etc., on which are indicated all of the circuits involved; the control of the operating coil, and circuits functioning through the contacts and interlocks of this device. This data book, which has helped wonderfully as a time saver in locating control troubles, and the sequence chart, shown in connection with the March 10 article, are most important in successful inspection work.

A casual inspection is made of each plant once a day at present, the time consumed in looking over graphic charts and condition of equipment requiring approximately twenty minutes. Every two weeks a thorough detail inspection is made, at which time all routine maintenance work is done and all equipment blown out and thoroughly cleaned. The cost of inspection alone, not including time consumed between plants, now averages $8 per unit per month.

Considerable thought has been given to the matter of inspection records or forms. At present a small blank for daily inspections is in successful use, but is not applicable for detail inspection. The usual form of record in which each device is tabulated, together with all component parts requiring inspection, would require a large, unwieldly report sheet, the use of which would not only slow up the process of inspection but would also be of questionable value. The value of inspection reports depends upon the ease of compiling operating data from them and of checking back in event of failures. The responsibility for the report and the thoroughness of the inspection must rest with the inspector. The form illustrated in Fig. 8 will, it is believed, prove not only conducive to good inspection, but it is simple also, yet contains sufficient information for compiling

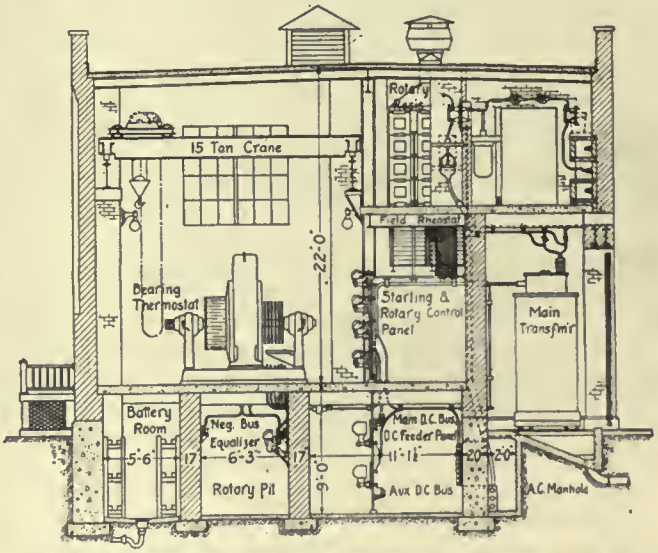


Fig. 10—Longitudinal Section of Proposed Automatic Substation

performance data, etc. The inspection chart, measuring 11 x 28 in., has every piece of equipment represented in outline or in block form, against which the inspector may check as inspected. On the reverse side detailed information is noted regarding any difficulty found and the condition of the building and general information.

Proposed Automatic Substations

The period which has elapsed since the present stations were erected has afforded an opportunity to study the requirements of a structure suitable for automatic equipment on this system. Restrictions imposed by the city government, together with those frequently encountered in individual locations, have made it impossible appreciably to reduce the cost of the building by cheapening the exterior, because of resultant effect upon the appearance of the structure. Savings are possible, however, in numerous instances by reducing the size of the

building. In designing these proposed stations, full advantage has been taken of the fact that automatic equipment was to be installed. This resulted in the utilization of areas within the structure to a much better advantage than had heretofore been possible. The locations of the various items of equipment, which in former plants were of necessity arranged with consideration to ease and expedition of operation, have been rearranged in order to simplify the connections and minimize the size of the housing structures. As a result of this redevelopment of substation buildings a reduction of approximately 30 per cent in floor area has been affected, and the cubical contents of the proposed building indicate approximately a 60 per cent reduction, when compared with the existing plants on a two-unit basis. Estimation of the cost of such a building upon the cubic foot unit basis, checked against a contractor's bid price, indicates that the buildings may be erected for less than 40 per cent of the cost of the present structures. The kilowatt installed capacity is identical in both instances, as is the case with the various items of control, except for the elimination of the d.c. feeder current limiting resistance.

Results of the development of a standard automatic substation building that can be erected either as a single or two-unit plant as illustrated in Figs. 9 and 10. The single-unit building is shown in full lines while the two-unit plant is illustrated as an extension in dotted lines. With conditions as they exist in urban centers regarding availability of real estate, values, restrictions, etc., it is possible that, due to increase of load in a given territory, it may become economically necessary to increase an existing single-unit plant to one of two units. The proposed layout was designed with that contingency in mind, only the wall section marked A in Fig. 9 having to be removed, and no equipment, circuits or barrier structures being disturbed. The resulting two-unit plant would be identical in all details with that of a plant originally built to contain two units.

Referring to the longitudinal section of the proposed plant, Fig. 10, it will be noted that a rather radical departure has been made from the present standard of substation layouts. By meeting the conditions imposed by fire underwriters' rules, oil-cooled transformers are permitted to be used. These transformers, while in the same building, are entirely sealed off from the rest of the substation equipment. The converter control, including starting panels and the a.c. incoming line control, are located on the main floor. The outgoing d.c. feeder panels are located directly beneath in the basement, from which the feeder cables leave the plant. Likewise, the negative drainage panels will be located in the basement.

The segregation of high-tension circuits from low tension is obtained by extending the structure covering the transformer vaults to comprise a balcony upon which is grouped all high-tension equipment. As a matter of insurance to service, all high-tension phases and equipment are separated by the customary barrier construction, this being deemed advisable for a station in this type of service. To provide against station shutdown, due to failure of the high-tension line normally supplying energy to the converter, the single-unit plants will be provided with a second source of energy, either from an a.c. ring system or from some emergency source of energy readily available, controlled either automatically or by remote control.

The Readers' Forum

Labor Costs in Boston and Philadelphia

BOSTON ELEVATED RAILWAY

BOSTON, MASS., March 9, 1923.

To the Editors:

In your issue of Feb. 24, 1923, on page 347, was printed the annual report of the Philadelphia Rapid Transit Company. Quoting from this report was printed the following:

> Boston is operated by public trustees, with union working conditions enforced. Its labor cost is 3.61 cents per passenger carried.
>
> Philadelphia is operated by men and management, cooperating for economic accomplishment. Its labor cost is 2.23 cents per passenger carried, which cost includes the co-operative wage dividend.
>
> Philadelphia carried 848,883,512 passengers during 1922. Its labor cost of 2.23 cents per passenger, compared with Boston's labor cost of 3.61 cents shows P.R.T. savings from greater efficiency to be $11,714,592.

Subsequently, upon inquiry of the Philadelphia Rapid Transit Company, I received the following reply:

> Answering your inquiry of the 1st inst., relative to labor cost per passenger carried in Philadelphia and Boston, I hand you herewith the basis from which the unit costs were derived, viz.:

	Philadelphia	Boston
Passengers (total)	848,883,512	409,039,586
Labor cost	$18,940,760	$14,772,340
Labor cost per (total) passenger carried	2.23 cents	3.61 cents

The Philadelphia Rapid Transit Company calculates its unit costs upon the basis of total passengers carried; i.e., revenue passengers and transfer passengers, on the grounds that car capacity and platform time, etc., have to be supplied in order to give the transfer passenger his second ride, and to all intents and purposes he, therefore, becomes another passenger. Calculating the labor cost on the basis of total passengers changes the cost per passenger from 4.143 cents, as shown in your published report, to 3.61 cents, the corresponding figure for Philadelphia being 2.23 cents.

On the basis explained in this letter the figures of 409,039,586, according to our official figures of total revenue and transfer passengers, should have been 663,529,529, which on the basis of comparison used by the Philadelphia Rapid Transit Company, makes the labor cost 2.226 cents per total passenger, or to all intents and purposes the same as Philadelphia.

The following tabulation gives the official figures of revenue passengers and total passengers (revenue and transfer), operating wages and wage cost per total passenger on the Boston Elevated Railway since 1917:

Year Ending Dec. 31	Revenue Passengers	Total Passengers Revenue and Transfer	Operating Wages	Wage Cost Per Total Passenger, Cents
1922	356,593,942	663,529,529	$14,772,340	2.226
1921	337,252,080	634,218,245	15,563,255	2.454
1920	335,526,561	640,010,337	17,216,445	2.690
1919	324,758,685	616,932,089	15,107,694	2.449
1918	348,664,700	660,537,597	11,007,362	1.666
1917	381,017,338	697,897,989	8,998,478	1.289

While I am sure that the Philadelphia Rapid Transit Company did not intend to make an unfair comparison, nevertheless in view of the widespread publicity both in the newspapers in Philadelphia and in your journal, this information has been broadcasted and it is regrettable that the figures used in the comparison were not similar and accurate.

I would thank you, therefore, if you will be so kind, in view of the letters which I have received because of this information, to publish this letter in order that in so far as possible the impression created thereby may be corrected. EDWARD DANA, General Manager.

Maintenance Notes

Making a Noiseless Granite Block Paving

FOR a number of years the city of New Orleans, La., required the railway company to pave the track area with wood block and there now exists on the electric railway lines in the neighborhood of 60,000 sq.yd. of wood block paving in track area. A visual inspection of this yardage indicates that this type of paving in the track area of New Orleans has not been a success.

The New Orleans Public Service company, therefore, undertook in the early part of 1922 to break up this practice and to establish granite block as the standard paving for track area. After starting this campaign the railway found that the city authorities, the Chamber of Commerce and the public generally objected strenuously to another type of paving in track area on the basis that, regardless of how poorly wood block lasted or how expensive it proved, the company should stand all extra expense due to the great benefit the public obtained by the noiselessness and smoothness of wood block paving. The railway, therefore, found that it was impossible to obtain its desires in this matter if it insisted upon granite block paving in track area laid with sand and cement grout. The company then concluded that the best move to make was first to investigate thoroughly what methods the larger cities in the United States had used in the laying of granite block in track area and if any street railway or city had been able to lay granite block successfully with bituminous or mastic filler and, secondly, to commence experimenting with a mastic filler granite block paving construction at such points in the city as would not bring on great objections from the public and run into the possibility of injunction.

After a trip to Chicago, Detroit, Cleveland, Toronto, Buffalo, New York, Boston, Philadelphia and Portland, together with the experimental efforts of the railway, the conclusion was reached that an extremely satisfactory result could be obtained with granite block paving by the use of an asphalt mixed with hot sand in the proportions of about half and half. For the New Orleans climate it was found that a 40-45 penetration at 77 deg. F. asphalt met the condition best and that the real problem was to obtain a portable sand heater that would not only give the quantity of hot sand required but would heat this sand uniformly from a temperature of 350 deg. F. to 400 deg. F. or to about the same temperature to which it was necessary to heat the 40-45 penetration asphalt. It was found that asphalt would not thoroughly mix with sand unless the sand was uniformly heated to at least the temperature of the asphalt.

Upon this basis the company developed a portable sand heater based on the principle of a coffee roaster. The sand heater consisted of a rotating drum operated by a 550-volt motor which gets its power from the trolley wire, and by means of belting and gearing a speed on the drum of about twenty revolutions a minute was obtained. With a fire box surrounding the drum old ties and other scrap wood obtained from the general track maintenance were burned. This sand heater, with the exception of the motor, has an appearance very similar to a 500-gal. asphalt heater.

The granite block is laid in the usual manner with a hammer on a sand and cement cushion, and after the blocks are thoroughly tamped they are sprinkled with water to hydrate the cement in the sand cushion. It is found that all signs of water disappear in a few hours and then the hot asphalt and hot sand are mixed in proportions of about half and half in an iron wheelbarrow by the use of a hoe. When this is thoroughly mixed it is applied to the granite block paving and is spread over the blocks with an ordinary squegee.

When this type of paving is completed a layman is not able to tell that it is a granite block street because it looks exactly like a sheet asphalt paving, and it is just as noiseless and smooth as any wood



Applying Hot Asphalt and Sand to Granite Block Pavement. Sand Heater in the Foreground, Asphalt Heater in the Background

block paving. As a result of this work the railway has been recently requested by the city authorities in the future to consider this type of paving as standard and use it throughout in the track area regardless of the amount of vehicular traffic on the street.

Rehabilitating Control Switches

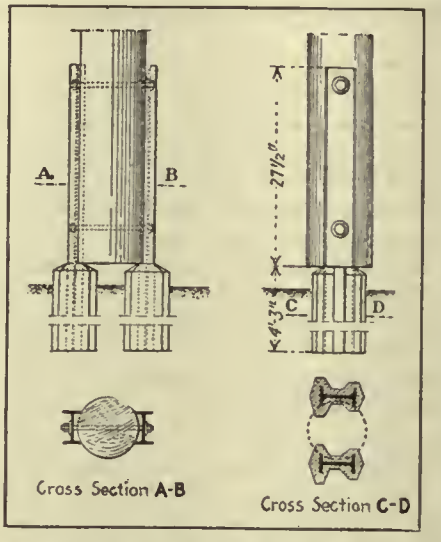
AFTER long continued use the bronze bearings of control switch arms become worn and because the shafts do not make a complete turn the wear enlarges the bearings to an elliptical shape. The San Francisco Municipal Railway makes a practice of overhauling these switches about every 75,000 miles, which is the equivalent of about 7,500 hours of operation. Worn shafts are renewed most economically by replacement, but the worn bearings which are integral parts of the switch mechanism itself must be restored if economical repair is to be made. This is accomplished effectively by filling the worn bearings with brass, using the oxyacetylene torch to melt and place the metal in the desired position, and then drilling the holes to the desired diameter. Not only the main shaft bearings but also worn sockets in all parts of the mechanism are treated in the same way.

Usually work of this sort is kept until enough has accumulated to keep the torch busy for a full day or two, then the entire collection is renewed at one time. Numerous small parts, such as ratchet wheels for brush-holder springs, etc., are reconstructed in this way in slack time and at small cost and are found to give very satisfactory service. Holes adjacent to the worn bearings are filled with putty to avoid the danger of the hot metal spilling into them.

Reclaiming Wood Poles

APROPOS of the discussion on reclamation of wood poles rotted at the ground line at the 1922 convention of the American Electric Railway Engineering Association, a description of the Forclum system, given in a recent issue of *Le Genie Civil*, is of interest. This is proposed for new poles so as to avoid destruction in the ground, but is applicable to old poles as well.

In the Forclum system the pole is supported above the ground surface by means of two steel I-sections, which are imbedded in concrete below and slightly above the ground line. This arrangement, of course,



Forclum System for Supporting Wood Poles Free of the Ground

gives a practically perfect aeration of the wood. The mechanical support can be made as substantial as desired by enlargement of the concrete foundations.

The process of setting a pole consists in placing the concrete foundations at the proper distance apart, the pole being supported by means of a bar and blocking at the proper distance above the ground. The pole is then bolted in place, two holes having been bored through it to register with the holes in the I-section. The earth is then tamped into place and the supporting bar and blocking are removed.

Lamp Filament Breakage Serious Factor

THE maintenance of car lighting consists chiefly of lamp replacement and inspection of switches and sockets. The greatest trouble experienced consists of the breakage of lamp filaments, which sometimes short-circuit and cause burning out of the lamps. In car service, where the lamps are subjected to severe vibrations, tests indicate that the life of the lamp is greatest when kept burning continuously. Tungsten metal which is used for the filament can be subjected to severe vibration when hot without breaking, but when the metal is cold it is very brittle. In this connection some results obtained from a test of two cars in service are interesting. One of these cars had the lights burning continuously while it was in service and the other had the lamps burning only when necessary, due to darkness. Each car was equipped with thirty-five new lamps and after twenty-four hours service the car that had the lamps burning continuously still had all filaments in perfect condition. The car with the lamps burning intermittently developed five cases of lamps with broken filaments, which resulted in two lamp circuits being inoperative. Three of the lamps with broken filaments had become welded, so that a portion of the remaining sections of the filaments were short-circuited. Lamps burning in this condition cause a higher current through the circuits, which decreases the life of the other lamps. The cost of the power used to burn the lamps continuously was 31 per cent less than the cost of replacing the five lamps with the broken filaments. The cost of the extra power used due to the short-circuiting of the welded filaments was not recorded.

Should Trolley Poles Be Raked?

BY G. H. MCKELWAY.
Engineer of Distribution, Brooklyn (N. Y.) Rapid Transit Company

WHY are trolley poles set with a rake away from the track while the poles of lighting or telephone companies are set perpendicularly?

This question is often asked, but unsatisfactory answers are very often made. While most street railway men agree that the poles should be inclined away from the track, yet the opinion is by no means unanimous, and some of those who think that the poles should be raked can give no better reason for so doing than that it is the custom to do so, or that the practice is called for in the Engineering Manual of the American Electric Railway Engineering Association.

Some of the reasons advanced against the practice are that the appearance of a line of raked poles is not as good as that of a line of straight ones, and that the railway companies are the only public utilities to set their poles in that manner. Where railway poles are set raked back, in line with and between other poles of the same size set perpendicularly, the resulting appearance of the line of poles of both types is not good. Moreover, the

lighting or telephone poles would appear to be falling over if they were set with the same rake that is given to the railway poles, and such a method of setting would not give as strong a line as if the poles were set straight.

In many cases the diameter of the railway poles is much smaller than that of the other poles and therefore they can be given at least a slight rake without their projecting so far behind the other poles as to be very noticeable. When the railway poles are the only ones on the street many people prefer the appearance of them when raked to that obtained by setting them perpendicularly.

Arguments in Favor of Raking

When it comes to utility the arguments are all in favor of raking the poles. The weight of the bracket arm or the pull of the span wire exerts quite a force upon the pole, which tends to draw its top in the direction of the trolley wire. While the tendency of the raked pole to fall away from the trolley helps in some slight manner to balance this pull of the span or arm, a still greater reason for raking is that this pull of the bracket or span tends to bend the pole, and that therefore while the pole may have been set with a rake before anything was attached to it, yet after such attachments were made the bending of the pole will be great enough to straighten it appreciably and make it look as if it had been set nearly straight up and down.

Another reason is that this pull toward the street is continuous as long as the pole is in use and, however well the pole may have been set in the first place, even if set in concrete or well keyed, in the long run the pull will have an effect and the pole will be drawn slowly toward the street. When the pole has been pulled so far over that it is leaning toward the track it will have to be reset, but if it has been given a rake in the first place, it will have to be pulled over much farther from its original position before this resetting is necessary, and the precaution will add several years to the length of time intervening between the time that the pole was first set and the time that it has to be reset.

Still another reason for raking the poles, and one that applies only in cities or towns, is that the poles have to be set close to the curb line and that therefore they are very close to vehicles drawn up against the curb.

The overhang of these vehicles is generally greatest at a point several feet above the surface of the street, so that a pole that is perpendicular or that leans toward the street is much more apt to be struck by a vehicle than is one that leans away from the curb.

It would seem therefore that, except where the railway poles are set in line with others, the better practice is that recommended by the Engineering Association—to set them with a slight but not too great rake.

A master mechanic has had neatly lettered and mounted for the benefit of his men the following definition of efficiency which he picked up somewhere: Efficiency is the power to do, in the safest, shortest and simplest way, the most and best.

Handling and Salvaging of Cement Bags

Loss of Bags on Montreal Tramways Property Reduced to Negligible Amount by Use of Systematic Follow-Up Plan

By R. B. Genest
Chief Clerk Engineering Department
Montreal Tramways

At the close of 1918 the stores department of the Montreal Tramways reported to the engineering department a shortage of 17 per cent in the return of empty cement bags. An investigation was made immediately to determine the causes of the shortage, and it was found that a number of these were outside engineering department control.

For example, return shipments were not made frequently enough to the cement company; bags were allowed to remain in storage for long periods without sorting and classification; there was no stated time arranged for the collection of empty bags, etc. The matter was considered important enough to have special attention and the following plan was worked out:

The special form reproduced herewith was devised and a special timekeeper was appointed to supervise the collection and return of empty bags twice weekly. He also follows return shipments through to the stores department and to the cement company, and checks quantities and classification in co-operation with their representatives.

The duties of the checker were further increased as shown by the instructions quoted below:

1. Supervise return of empty bags to the Canada Cement Company.
2. Make two trips each week with

MONTREAL TRAMWAYS COMPANY
ENGINEERING DEPARTMENT
CEMENT REPORT

No. 183 E 47

Location 4169 Wellington St Date, Aug 31st 1922

DATE	NO. BAGS RECEIVED FROM STORES		NO. BAGS RECEIVED FROM TRANSFERS		TOTAL	NO. BAGS DELIVERED ON TRANSFERS		NO. BAGS RETURNED TO STORES		TOTAL	BALANCE ON HAND	Reference to Stores Report	REMARKS
	Req. No.	No. Bags	Credit No.	No. Bags		Credit No.	No. Bags	Credit No.	No. Bags				
Aug 14	54380	400				482	50	483	500				
18	54389	400				498	40	585	500				
24	54398	400				501	80	394	400		30		
29	54501	400											
TOTAL		1600					170		1400		30		

Enter in Remarks Column where Transfer is Received From, or Delivered to.
This Report to be made out monthly and sent to chief clerk, Engineering Department.

Foreman H Scott Checker P O'Neill

Cement Report Form Used by Montreal Tramways

the construction car, covering all work orders and division headquarters to pick up empty bags.

3. Make monthly check of cement on hand to balance with timekeeper's record.

4. Supervise the movement of stone, sand and cement. Make daily trips to the stone quarries, sand company and storekeeper in following up orders.

5. Supervise the return of scrap copper cable to the storekeeper.

6. Supervise the distribution, transfer and handling of tools. Consult daily with tool clerk and storekeeper.

The results of this systematic work are shown in the following tabulation:

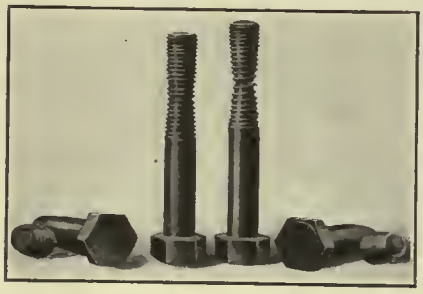
Year	Percentage of Shortage
1918	17.0
1919	0.0
1920	3.2
1921	1.7
1922	1.04

Heat-Treated Bolts

BY HARRY L. SIGNOR

Renewal Parts Engineering, Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa.

THERE are a number of bolt applications on electric railway car equipment where if the bolts fail for any reason or work loose the riding qualities of the car are affected, operation becomes dangerous and the cost of maintenance increases rapidly. A great deal of



Examples of Worn and Broken Bolts

trouble has resulted from motor frame, axle cap and housing bolts working loose in service, thus allowing these parts to wear badly before the trouble is found and corrected. Causes, such as bolts not drawn up tight, no lock washers and the presence of dirt under the bolt head and the nut, can be overcome by more care during the inspection and overhauling of the motors.

The stretching of the bolts due to an inferior grade of material, aggravated by shocks and blows received in service, seems to be one of the chief difficulties tending to cause bolts to work loose. This has been overcome by the use of special high-grade heat-treated bolts of axle steel, which are temper drawn to give toughness and strength. The heads of these bolts are machine forged, which insures uniform size and a good wrench fit, and they are also carefully machined and threaded. In order to distinguish these special heat-treated bolts from standard hardware bolts, it is considered good practice to have some distinguishing mark on the head of every special heat-treated bolt, as, for instance, the letter "O," as shown in the accompanying illustration. This is of great advantage to the workman, as it enables him at a glance to determine the grade of bolt being used.

Heat treatment will produce values of elastic limit considerably in excess of standard hardware bolts as shown in the table of comparative tests. This process, however, involves quenching and drawing operations, which requires great care in handling. When handled in bulk, special apparatus is required for these operations to maintain constant conditions, which is essential to produce a uniform product.

It is considered good practice and the best manufacturers require a test of one bolt representing each annealing charge where these contain small quantities. If the charge contains more than 500 bolts, tests are made of one bolt from each additional 500 or fraction thereof.

Relative costs, depending upon size, shape and quantities required, show that special heat-treated bolts cost approximately two to three times as much as standard hardware bolts; this, however, is offset by more than 100 per cent increase in elastic limit and ultimate strength of a heat-treated bolt over one of standard hardware.

COMPARATIVE TEST OF BOLTS

Kind	Tensile Strength	Characteristics
Standard hardware	25,000 lb. average yield point	Brittle and variable
Axle steel (heat treated)	60,000 lb. average yield point	Tough and strong

Shop-Constructed Hydraulic Press

BY CLIFFORD A. ELLIOTT

Cost Engineer Pacific Electric Railway, Los Angeles, Calif.

THE accompanying illustration shows a shop-made hydraulic press which was recently built in the shops of the Pacific Electric Railway, Los Angeles, Calif. This is used for emergency signal repair work and takes care of the maintenance necessary for the engineering department's motor trucks, gasoline motor section and inspection cars, as well as the repairs to all track, bonding, bridges, paving and signal tools.

This press has been installed out in the open at a convenient location for its use. The machine as constructed consists of a top beam operated by a brake cylinder and having a fulcrum support at one end. The upper beam consists of a piece of 60-lb. scrap rail 8 ft. 3 in. long from bolt center to bolt center. An obsolete Westinghouse 8-in. x 8-in. brake cylinder is used for operating this lever and is installed at one end, as shown in the illustration. The base is made of two pieces of 60-lb. rail turned base side upward, each rail being 8 ft. 6 in. long. The fulcrum extends upward from the base so as to support the upper beam at one end. This fulcrum is 36 in. high and is constructed of scrap bar steel. It consists of two strips 2½ in. wide by ⅜ in. thick.

The post which supports the brake cylinder and end of the base is made from a scrap piece of 10-in. x 10-in. redwood. This post extends 7 ft. above the surface of the ground, this



Shop-Made Hydraulic Press

height being necessary in order to obtain the proper leverage. This main post is further supported by a section of 12-in. x 18-in. bridge timber placed beneath the surface of the ground and extending above to a sufficient height to support the end of the lower beam. This post is slotted to receive the rails which serve as a base. Another redwood post 10 in. x 10 in. forms the support at the fulcrum end.

The cylinder pressure is obtained from the water service which has two connections with a two-way valve. The pressure line is of ¾-in. iron pipe and the discharge line is 1-in. pipe. A wooden lever arm extends from the cylinder to the rear of the device for regulating the water pressure. The end of this lever rests on a lateral arm extending from the

fulcrum. This lever permits the operator to work in any position about the press and still be able to regulate the water pressure.

In constructing the base each end of the rails used was sheared back 8 in. with an acetylene torch. The bulky portions of the tread and base of the rail were thus removed. The main web section of the rail was used for connecting up to the rear fulcrum. The die used with the machine was constructed of scrap material and the adjustable screw for the die was made from a screw removed from a scrap rail bender.

Copper vs. Phosphor Bronze for Brushholder Contact Tips

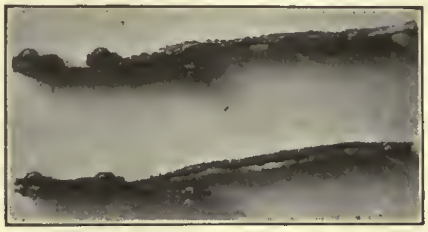
BY JOHN S. DEAN
Renewal Parts Engineering, Westinghouse Electric & Manufacturing Company, Pittsburgh, Pa.

CONTACT tips on brushholder pressure fingers have been made of brass or copper and of various shapes. More recent practice in connection with the brushholders on modern motors is the use of a flat contact tip made from copper. In some cases these tips are riveted to the shunt and pressure finger spring, while in others they are brazed to these parts.

In some recent designs of the riveted type countersunk head rivets are used, while others are held by round-head rivets. With the use of the countersunk head rivets it becomes necessary to use a thicker tip to provide for the required countersinking, which makes the tip heavier and gives it a greater inertia.

With the use of the roundhead rivets the tip can be made lighter, but must be somewhat longer so that the round head of the rivets will clear the top of the carbon. However, with this type of construction a better mechanical job of riveting is obtained and the tips are less likely to become loose in service.

It has been intimated that better results might be obtained from these flat contact tips if they were made of a harder material, the idea being that by the use of this material it would tend to reduce or entirely eleminate the wear which has sometimes been noticed on tips operating under certain severe service conditions. To check this point a number of experimental flat tips of



Above, Phosphor Bronze Tip Worn Through by Arcing. Below, Copper Tip in Same Service

the riveted type were made up of copper and a similar number from phosphor bronze, and these were placed in brushholders that were mounted on motors operating under similar conditions.

After about 22,000 miles of service these special test tips were inspected and it was found, without any exceptions, that in all cases the phosphor bronze tips showed excessive wear, while the copper tips had worn relatively a small amount, as compared with the wear on the phosphor bronze, as can be seen in the attached photograph.

It has been suggested as a possible explanation for this excessive wear that the phosphor bronze tip with its relatively high specific resistance offers a greater contact resistance to the working current passing from the carbon to contact tip or vice versa. This, in turn, produces heating and arcing, setting up a burning action which rapidly reduces the section of the tip at its point of contact with the carbon brush, this action being more pronounced in the case of the phosphor bronze, as the latter metal is a copper base alloy containing varying percentages of tin and lead which volatilize at a comparatively low temperature and result in the burning action at the point of contact.

Stop the Leaks

THE employees of the Jinxville Electric Railway were meeting in one of their social rallies the other evening, story telling, songs, smokes and all that. The general manager, William Redfield, was called on as usual for some remarks, He responded something like this:

"I'm tickled to death the way you boys are co-operating with the heads of departments in helping me bring the property up to a condition of which we can all be proud. You're doing fine. Take, for example, the machine shop. Have you noticed how that's improved lately because the fellows are pulling together to keep the place looking neat? And a neat shop means good work."

"Now that I'm on my feet," continued the G. M., "there's a little matter I want to get off my chest, a matter in which you can all help. I notice as I go about the property a lot of little items of waste that in the aggregate represent a lot of money. A stray track bolt here, a dripping faucet there, a bit of line wire somewhere else; each rather insignificant in itself, but indicating a lack of appreciation of what waste means. If these items, summed up, could be visualized in cash, the amount would be great.

"Now you fellows know I hate to preach, but I was thinking maybe we could get up some kind of a scheme for cutting down these wastes. The only way I see to do it is for everybody to be on the watch to do two things—first, get the pick-up habit; and, second, send in suggestions as to how things can be done better with the idea of saving money. Put your comments in writing and hand them to your foremen. They'll take your suggestions up with me if necessary, and you'll be told what is done with them. Our property isn't large enough to need any elaborate machinery for handling these suggestions. Let's have a little discussion on this matter."

"Boss," said Jones, the machine shop foreman, "thanks for your compliments about the shop. It sure does look better since we began to get the men interested in keeping the machines neat. We're trying every known scheme to keep up this interest. Now, as to your idea about cutting out waste, we can all help out on that. We'll get right out after suggestions, and we'll get 'em all right. It strikes me that if everybody will think about this matter for a while, we'll get into the habit after a time."

"How about the line department, John?" said the G. M., turning to O'Neill, the overhead superintendent, "where do you come in on this?"

"We're with you, boss," O'Neill replied, "this idea of stopping the leaks appeals to me. We're pretty careful in our department, but there are many places, doubtless, where we lose things. I'll see what the boys have to say."

"I hope this discussion hasn't been too serious for a social evening," said the G. M., taking his seat. "You fellows know how anxious I am to keep up the service on this railway. With your help, even with the low fare we get, I believe we can have a crackerjack property, when we all pull together."

"Aye, aye, chief, we're with you!"

Maintenance of Automatic Slack Adjusters

By W. H. SAUVAGE
Designing Engineer, Gould Coupler Company, New York, N. Y.

THE taking up of slack in the brake rigging of electric cars by the old method required either changing the pins in the upper end fulcrum of the truck dead lever or the disconnecting of the bottom rod truck lever. Accurate adjustment at these points was hard to obtain, since the distance between the holes was usually from 1½ in. to 2½ in. apart. This often resulted in either a too close or a too loose adjustment, so that the piston travel would vary from 2 to 3 in. of that desired.

Another and more familiar method consists of the use of a turnbuckle. This type requires almost daily adjustment, and effective lubrication on the turnbuckles is hard to main-



Universal Brake Slack Adjuster, Type B

tain, as dust, dirt, water, snow and ice quickly destroy the best lubrication, and the location of turnbuckles underneath the truck subjects them to all sorts of dirt. This grit and dirt also cause rapid wear and short life of the turnbuckles.

Automatic slack adjusters thus came into use to overcome the difficulties of manual adjustment. Among the various types brought out were the Gould types A, B and C automatic slack adjusters, and the following applies to desirable methods of maintaining these. The maintenance of the Gould type A adjuster requires that the friction and adjusting rod be kept clear of grease and the friction be kept constant. Grease does not affect the friction of the B and C types. Barrels and dogs should be washed out once a year at least, and oftener if found necessary. The life of the grip dogs varies according to the service and load placed upon them. After two or three years' service, the dogs should be turned over so as to give them an additional two or three years' life. The successful operation of these two types of adjusters depends largely on keeping the usual release springs furnished at the upper end of the live lever in proper condition. These in every case must bring the levers back into full release position. The function of the adjusters is automatically to take up all brake shoe and wheel wear as fast as it occurs. When the push rods of the adjusters become indented, they should not be filed off, but hammered smooth. Filing is liable to get the rods out of round and make them undersized, while the hammering will not do this. The type of adjusters using four dogs with spring steel untempered rods do not nick or roughen up the rods by severe usage.

The type C adjuster was originally brought out for the Birney lightweight car, and this adjuster is now more generally used where six grip dogs were previously employed. This type does not rely for its successful operation on the foundation brake rigging release springs, but provides for release within its own mechanism. There are no hidden parts to the Gould automatic slack adjusters, so inspection can be quickly made and knowledge of any injured or worn parts obtained readily.

New Equipment Available

Casting Concrete Poles in Place

THE Helderberg Cement Company has just completed a new power transmission line at its Howes Cave works using concrete poles cast in place. W. J. Fullerton, superintendent of the company, who designed the poles and supervised the construction of the transmission line, claims three important advantages for this method: (1) Ease of erection, eliminating the necessity of handling heavy equipment. (2) The poles, being cast integral with their foundations, are more solidly bedded in the earth. (3) The cross-arms are cast monolithic with the pole, a feature which is not so easily accomplished where the poles are cast on the ground, and in handling the cross-arms are more apt to break.

The poles shown in the accompanying illustration vary in height from 27 ft. to 34 ft. from the ground line to the lower cross-arm, depending upon their location. The poles are square, 8 in. at the top, tapering at the rate of ½ in. to the foot.

After concreting the footings, forms for the poles were erected complete except for one side. After positioning reinforcing steel, concrete for the foundation of the pole was placed. Above the foundation the forms were fitted into the open side in short sections and followed with concrete. This permitted easy handling of the concrete and made it possible to spade it thoroughly against the forms. After removing the forms the poles were in perfect condition and of good appearance. The poles were erected at a cost of about $60 each.



Transmission Poles of Concrete Cast in Place

Closed-Front Type Brushholders for Motors

IN ORDER to increase the life of the carbon brushes used on ventilated railway motors and thus reduce the cost of maintenance of these parts the closed-front type of brushholder has been developed. One of the brushholders shown in the accompanying illustrations is for the Westinghouse No. 306 railway motor. It has a pressure finger of the harness type, fitted with a fifteen-tooth steel ratchet, and a pawl for adjusting the spring pressure. The other brushholder shown is of this type developed for the Westinghouse No. 508 railway motor, which does not use any harness in connection with the pressure finger. The adjustment of this type of mechanism is made by shifting the relative location of the holes drilled in the spindle or shaft and the holes drilled in the brushholder casting through which a cotter pin is forced to lock it.



Brushholder for Westinghouse No. 306 Railway Motor

Experimental tests conducted by the engineering department of the Westinghouse Company on this design of brushholder for various types of motors and on a number of different properties indicate that by thus closing up the front of the carbon box the life of the brushes is greatly increased, due to a reduction in the side wear on the carbons. These comparative tests were made with the standard holders and the closed-front type of holders operating under the same service conditions, using the same grades of carbon, and with brushholder spring tension, adjusted to the same pressure.

The advantages of this type of brushholder construction are as follows: (1) Dust and dirt are kept from working in between the carbon and the carbon box, thus reducing the side wear of the carbon; (2) the contact area between the carbon and the sides of the carbon box is increased; (3) the life of the carbon is increased.

Several suggested disadvantages that should be given some consideration are as follows:

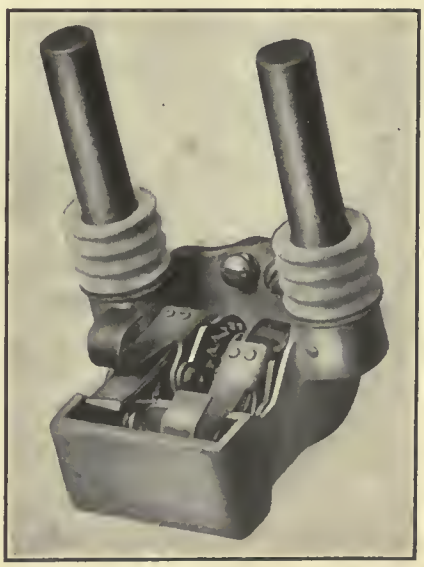
1. It is more difficult to remove the carbon from this type of box. This is, no doubt, true, especially after carbons wear down endwise. Experience to date has shown that operators over-rule this objection on account of the longer life obtained from the carbons.

2. The top of the carbons is more likely to be damaged by the use of the short, flat contact tip. So far this construction has not given any serious trouble in this way.

3. There is a possibility of the contact tip getting out of alignment and either striking the front sides of the carbon box or slipping off of the carbon, thus reducing or entirely releasing the pressure on the top of the carbon. This is a condition that may cause trouble if the adjustment is not properly maintained, but has not yet developed in service tests.

With due consideration to the above advantages and the suggested disadvantages, it is the general feeling among operators that the advantages more than offset the disadvantages.

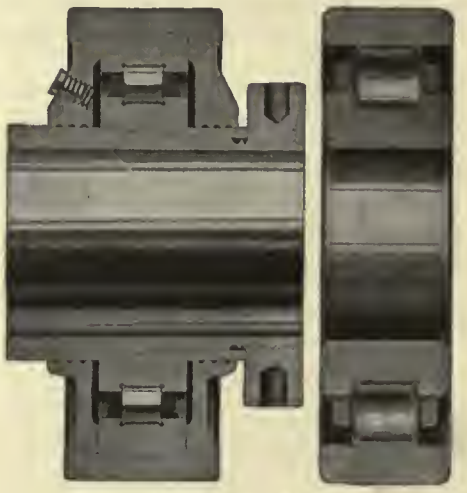
In developing improvements of this character, experience has shown that wholesale changes should not be made, but that it is better to try out a reasonable number in different parts of the country before adopting them as standard.



Harness Type Pressure Finger for Westinghouse No. 306 Railway Motor

New Roller Bearings to Be Marketed

THE Norma Company of America, Long Island City, N. Y., is placing the Hoffman roller bearings on the market in this country. The outer race or ring of the Hoffman roller bearing is of plain cylindrical form with rectangular cross-section and has a "flat-line" raceway on which the rollers run. The inner race or ring has a channel cross-section, with narrow rims on either side of the "flat-line" raceway to retain the rollers endwise. The rollers are cylindrical, with a length equal to their diameter, and they are held in exact parallelism with the shaft and with one another by these rims or shoulders, which are of hardened steel and allow only a very slight clearance for the rollers. The roller cage or retainer is of strong, balanced construction.



New Type of Roller Bearings

The Hoffman short roller and retainer is designed to eliminate the troubles experienced with other types of roller bearings using taper rollers or long rollers of small diameter. It is impossible, particularly at high speeds, to keep such long rollers rotating in parallelism with the shaft, with the result that the rollers wear concave and the retainer or cage is subject to undue and destructive wear, resulting in unsatisfactory bearing performance.

The Hoffman roller bearing has no end-thrust capacity. Where thrust is encountered it is necessary to hold the inner race and rollers in correct relation to the outer race by means of some locating device. Where the end thrust is small, it may be taken care of by thrust buttons at either





At Left, Placing the Rail Filler in Position. At Right, Pouring the Concrete Foundation After the Rail Filler Is in Position

end of the shaft. Where the end thrust is large, it is carried either by auxiliary thrust bearings or by "location bearings" of standard ball type and slightly reduced outside diameter, mounted between two roller bearings.

In addition to the bearing just described (a rigidly mounted type), the same general construction is followed in the self-aligning roller bearing shown in section in the accompanying illustration. Here the periphery of the outer race and its two dust-and-dirt-excluding covers are ground to form one continuous spherical surface, fitting a similarly shaped inner surface on the shell or housing. The bearing is thus free to align itself with its opposite members, the dust covers following movement. This feature permits these covers to be bored with a very small running clearance on the clamping sleeve, so that lubricant cannot work out or dust get into the highly finished bearing surfaces. In the type illustrated the clamping sleeve extends clear through these dust covers so that the bearing may be properly mounted without exposing its working parts.

The following advantages are claimed for the Hoffman precision roller bearing: (a) A running friction about ⅓₀ that of a well-fitted plain bearing and a starting friction about 1/800 that of a plain bearing; this latter feature is of special value in electric motors and with belt drives; (b) steady load capacity; (c) large temporary overload capacity; (d) ability to stand up under shocks and vibrations; (e) speed qualities equal to those of a ball bearing; (f) no heating and no risk of seizing; (g) no lubrication troubles, the bearing being grease-packed and needing replenishing of lubricant only at intervals of three to twelve months, depending upon the running conditions.

An Elastic Rail Filler

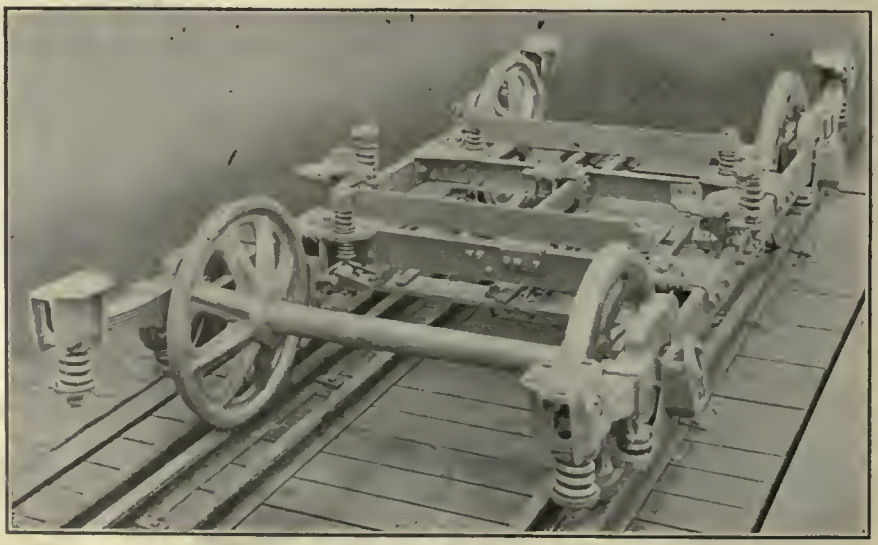
IN ORDER to provide a bituminous cushion between the rigid pavement and the vibrating rail of electric railway tracks, the Philip Carey Company, Cincinnati, Ohio, is marketing its "Elastite" rail filler. This asphaltic compound is furnished in strips of from 3 to 5 ft., and can be fitted against the web of the rail by light driving. In thickness the rail filler extends slightly beyond the head of the rail so as to serve as an expansion joint for the pavement. The material is factory made, of uniform dimensions, and is ready for use when delivered. When there are projections, such as at special work, tie rods or braces, the filler can be readily cut to provide for its installation.

New Type Truck

THE J. G. Brill Company, Philadelphia, Pa., has developed a new single truck designated as No. 79-EX for service under the heavier types of single-truck cars. The outstanding feature of this new truck is its long effective spring base, which insures a steady riding car and a flexible support under each car body corner. The Brill 79-EX truck supports 90 per cent of the weight of the car body on its four corners and only 10 per cent on its center coil springs. These latter therefore do not act as a fulcrum to the overhanging ends of the carbody, so as to cause an oscillating or galloping motion.

Each corner of the car body is supported on a flexible arrangement consisting of an easy-acting coil spring suspended by a swing link from the quarter-elliptic plate spring anchored to the end of the solid-forged side frame and extending into a notch in the truck pedestal. This combination of springs prevents any disturbing truck action set up by track irregularities from passing up into the car body.

Mounted on each side bar at one end of this truck is a trunnion device for connecting to the car body. This imparts firmness to the longitudinal direction of the car, eliminates lost motion, and enables the truck to take advantage of the rigid body construction and vice versa. This permits the elimination of unnecessary reinforcement.



The Long Effective Spring Base Insures Steadier Riding

The News of the Industry

Detroit's Future Dips

$10,000,000 Proposed to Be Spent on 3.1 Mile Underground System Downtown—Immediate Relief from Congestion Necessary—Construction of Comprehensive High-Speed Lines Will Follow

THE tentative plans for a system of dips to carry street cars below the surface of the heart of Detroit, as submitted by the engineers of the Street Railway Commission, are being studied by Daniel L. Turner, advisory engineer for the Detroit Rapid Transit Commission. Chairman Sidney D. Waldon of the Rapid Transit Commission has announced that the commission will soon report on the feasibility of the project.

Under the plans submitted, four radial lines of underground railways would branch out on Woodward Avenue, Michigan Avenue, Fort Street and Gratiot Avenue, and sixteen to twenty of the car lines now entering the downtown district would utilize these subway tracks. Only a few of the present feeder line cars would run on the surface. The plans, according to an announcement by Ross Schram, assistant general manager of the Department of Street Railways, were submitted at this time with a view to their being developed during the summer months in detailed studies and made available for submission to the voters for decisive action at the November election.

For nearly eight months the engineers of the Department of Street Railways have been studying ways and means for speeding up the handling of street car passengers. Twenty of the twenty-eight different routes comprising the street railway system enter the half-mile circle. Conditions have reached the stage where it is considered impracticable to reroute cars or loop back cars short of the downtown area.

The first step as outlined by the department provides for four sets of underground tracks on Michigan Avenue between First Street and Campus Martius swinging northeast through the central loading station to Monroe Avenue, Randolph and Gratiot Avenue, emerging on Gratiot Avenue near Mullett Street. The total length would be 1.4 miles with an estimated cost of $4,000,000.

The second step proposed is an underground tube beginning at Fort Street west of Fourth Avenue, running to Griswold Street with an underground loop south on Griswold Street to Congress Street again. The total length would be approximately 0.7 miles and the cost is estimated at $1.750,000.

The third step proposed is an underground tube beginning at Woodward Avenue in the vicinity of Winder Street, continuing south on Woodward Avenue, going under the Michigan-Gratiot subway at Campus Martius and coming to the surface on Woodward south of Jefferson to the surface loop on Woodbridge and Atwater Streets. This line would be about 1 mile long and cost about $4,250,000.

The total mileage in the three steps would be 3.1 miles. The estimated construction cost would be $10,000,000. These estimated costs include the grand central loading station on Cadillac Square and tentatively suggested loading stations on Michigan at Washington Boulevard, on Woodward Avenue, on Grand Circus Park and on Randolph at Broadway. Further development of the plan may indicate that these loading stations are not all most advantageously placed. It may also prove advisable to move the position of the portals slightly, but it is the opinion that in principal the plan is the best which can be developed at a minimum cost to take care of the situation in the central district.



Map of Central Area at Detroit Showing Subway Routes

With the addition of two-car and three-car train equipment to the system it is the belief of the Street Railway Department that the plan now advanced will do more than anything else to care for the traffic increases in Detroit pending the time the city is justified and willing to go ahead with a comprehensive rapid transit system.

With the portals as suggested it will be possible to bring into the underground terminals practically every car entering the half-mile circle. It is the tentative plan, however, not to operate the Fourteenth, Sherman, Brush, Harper, Jefferson, Fort East, Myrtle and Springwells lines into the tubes downtown. With the other cars removed from the surface in the central district it will be possible to speed up the operation of cars of the lines mentioned from the downtown section by a surface loop.

A plan for financing future rapid transit construction is now before the Michigan Legislature in the Wilcox-Culver bill. This measure, if passed, would permit bonding a municipality for rapid transit construction to the limit of 4 per cent of the assessed valuation. Under such arrangement the sum of $80.000,000 would be available under Detroit's present assessed valuation.

Samuel Insull Urges Chicago Subway

Transportation as the first essential prerequisite to a metropolitan district of Chicago was the keynote voiced by Samuel Insull at the City Club of Chicago on the occasion of a meeting for metropolitan planning. The meeting was called in order to "Plan our growth and grow to our Plan," as the slogan says. Mr. Insull said in part:

> No great plans for a metropolitan district of Chicago and its environs can be a success without adequate and sufficient transportation facilities in order to carry the workers from the working or manufacturing districts into the suburbs or home. A building program of transportation facilities must be launched with a view to the larger growth of the city which will provide for a population of 6,000,000 people in 1950.

Speaking as a director of two of the largest utilities in Chicago, he stated that the Commonwealth Edison Company will spend $25,000,000, the Peoples Gas Light & Coke Company $3,000,000 and the Illinois Bell Telephone Company $12,000,000 in the coming year in and around Chicago.

The transportation system in Chicago must spend a like amount in the coming years in order to relieve traffic congestion and provide adequate transportation. According to Mr. Insull, the first step in providing this transportation is an underground system starting from Eighteenth Street on the south and ending at North Avenue on the north. The latest figures indicated that on this plan a four-track subway would cost about $30,000,000 and would be the first step in the transportation solution. This amount of money could readily be made available for the project from the transportation funds of the city.

Thompson Is Through

Mayor Thompson of Chicago apparently is through as a factor in public life in Chicago. At the election in Chicago last fall there was no direct issue affecting the public utilities, but the candidates having his backing were defeated at the polls. As if that were not enough, Arthur C. Leuder, the Brundage-Crowe-Deneen coalition candidate, won the nomination for Mayor easily in the primaries on Feb. 27. He defeated Edward R. Litsinger, who is described as leading the forlorn remnant of the Thompson forces. Leuder resigned as postmaster to give battle to Thompson. His victory was bigger than his managers expected. His two running mates had no opposition.

On the Democratic side there was only one ticket. The choice of the Democrats for Mayor was William E. Dever. The Republicans are loudly proclaiming unification of their party in Chicago, but the Democrats are more than ever confident of their ability to elect their candidate for Mayor. They may be counted upon to take full advantage of the schism that has prevailed in the Republican ranks, the scandals of the present City Hall administration and the crushing burden of taxation that has been placed upon the citizens since the election of Mayor Thompson eight years ago.

New Franchise Proposed

A. C. Blinn, general manager of the Northern Ohio Traction & Light Company, proposed to Akron city officials recently a new twenty-five-year railway franchise, effective Feb. 1, 1924, providing for a 6-cent fare with free transfers, elimination of competition along the company's lines, relief from the initial cost of street paving between the company's tracks and $1,000,000 in proposed additions, extensions and improvements to the company property in the first five years under the new grant.

By an agreement entered into with the City Council the Northern Ohio Traction & Light Company has been charging a flat 5-cent rate for several years. The existing franchise provides for the sale of twenty-five tickets for $1. The new offer includes nine tickets for 50 cents.

$4,500,000 Transit Plan Urged at Boston

At the conclusion of a public hearing held recently on the plan to run Dorchester tunnel trains over the tracks of the New England Railroad to Fields Corner and Mattapan, the consensus of opinion among the committeemen was in favor of putting the scheme into operation to Fields Corner as soon as possible. No formal vote of the joint committees was taken, but it is expected that the extension to Fields Corner will be recommended to the Legislature at the present session.

Appearing at the hearing and giving their hearty approval to the Fields Corner plan were representatives of the Boston Elevated, the New Haven Railroad and the city of Boston. No one appeared in opposition. The cost of the project is estimated at $4,500,000.

H. Ware Barnum, counsel for the Elevated trustees, said that congestion at Andrew Square has become so great that steps must be taken to distribute the traffic during rush hours.

Transit Hearings Begun

Committee Appointed Recently by Mayor Opens Sessions to Which Public Is Invited

The committee, consisting of Milo R. Maltbie, Morris Llewellyn Cooke and Francis Lee Stuart, appointed by Mayor Moore of Philadelphia to study the various rapid transit plans that have been proposed for the city of Philadelphia and report to him on routes, held its first session on March 9.

After the meeting had been turned over to him by Mayor Moore, Mr. Maltbie said that every one desiring to speak would be heard. Col. W. B. Barber, chairman of the public utilities committee of the Chamber of Commerce, read a typewritten statement embodying the views of the Chamber of Commerce. He took no sides as to any particular route, but indicated that the need for construction of high-speed lines was imperative and that the Chamber of Commerce would be behind whatever plan might finally be adopted.

Edward E. Ziegler, representing the United Business Men's Association, North Philadelphia Business Men's Association and the joint transit committee of the Central Labor Union, said that he favored the original Taylor plan with only "such modifications as you engineers decide are necessary." C. Oscar Beasley pleaded with the commissioners "to give Philadelphia a push up the transit hill." He said he favored construction of elevated lines where possible as opposed to the more costly subway construction.

Ralph T. Senter, operating vice-president of the Philadelphia Rapid Transit Company, promised that that company would enter negotiations looking to an operating agreement for the city-built lines when the commission submitted its report. He said that Mr. Mitten's letter of Jan. 8 had been misconstrued. It was at this point that Mr. Senter gave assurance that Mr. Mitten would study the plans and take up with the committee an operating agreement when the plans were completed.

It will be recalled that the commission is under instructions from the Mayor to proceed immediately to an examination and survey of the plans of the Broad Street subway, delivery loop and other authorized high-speed lines prepared by the Department of City Transit and to report back to the Mayor on or before April 15 if possible, so that the recommendations may be submitted to the Council and a report made to the people with respect to a comprehensive high-speed system adequate to the present and future needs of the city.

Fare and Valuation Matters Up in Denver

Henry A. Dubbs, Denver attorney, was appointed master in chancery on March 2 by Federal Judge Robert E. Lewis to take the testimony in the fare controversy of the Denver (Colo.) Tramway which is pending in the United States District Court. March 12 was fixed by the court for the commencement of the taking of evidence on the value of the property. Separate valuations will be filed by the city and the receiver of the company.

Upon petition made shortly after his appointment, E. Stenger, receiver of the company, secured an injunction from the Federal District Court restraining the city from enforcing a 6-cent maximum fare ordinance upon the ground that it was confiscatory. The contention of the city that the company was bound to carry passengers for 5 cents under a provision of its franchise, upon the theory that this constituted a contract, was over-ruled by the court and permission was granted Receiver Stenger to increase the fare to 8 cents cash or two tickets for 15 cents. The ruling of the lower court was sustained by the Circuit Court of Appeals and application by the city for rehearing was denied.

The present proceedings are in the same case, but on an application by the receiver to make permanent the temporary injunction granted at the preliminary hearing in March, 1921.

The city of Denver has taken an appeal to the Circuit Court of Appeals from the decision of the lower court in its franchise tax case against the receiver of the Denver Tramway. The franchise granted the company in 1906 imposed a tax of $5,000 a month. This payment had not been made for some time prior to the appointment of the receiver on Dec. 24, 1920, and has not been paid since then.

Early in the year 1922 the city filed a petition with the Federal District Court asking that the city be given a preferred claim on the franchise tax debt in order that the city might be taken care of before other debts of the company were paid. Judge Lewis in a written opinion handed down April 25, 1922, ruled that the city was not entitled to a preferred claim, but the court did not rule on the question whether the city was entitled to the franchise tax money.

Employees Seek Wage Increase

Trainmen of the Municipal Railway, San Francisco, Calif., have presented demands to T. A Reardon, president of the Board of Works, through President Curry and Secretary Rowe of the carmen's union for a wage increase of $1 a day. At present conductors and motormen are receiving $5 a day.

Mr. Reardon said that the advance, if allowed, would mean an additional outlay of $400,000, which it would be impossible for the city to meet.

Hearing on New York Transit Bill

Local New York City Measure Only One of Five Bills Considered at Session on March 14—Slight Chance Ahead for Passage of Bill, Which Provides for Municipal Ownership

A JOINT legislative committee hearing was held on March 14 before the public service committees of the Senate and Assembly. While it had originally been intended to consider five measures affecting the regulation of public utilities, only the Walker-Donohue bill was considered. This measure would grant to the city of New York the power to construct, acquire, own, operate and regulate its transit facilities. The other bills went over until March 20.

The hearing lacked much of the snap of similar hearings of previous years. Such shining legal lights as Job Hedges and William H. Guthrie were conspicuous by their absence while the opposition developed the unique idea of having their sentiments voiced almost entirely by so-called "reformers."

The opposition was heard first and was lead by William McCarroll, president of the New York State Chamber of Commerce and former public service commissioner. Mr. McCarroll attacked the delegation of power by the Legislature to an official body elected by the people of the city of New York for an entirely different purpose than transportation regulation, which in turn is given authority to delegate its power so conferred to other bodies of such city government.

Former Commissioner Opposes Measure

Mr. McCarroll also raised the question of the constitutionality of the measure in the delegation of powers of regulation to a body that is itself a party in interest to proceedings which it may be called upon to adjudicate. The speaker also drew attention to the statement of Governor Smith in 1920 that the state should not delegate the power of regulation of utilities to any body that is not directly responsible to the Legislature. Mr. McCarroll said the present measure meant a return to the old system of thirty years ago and declared that in thirty-six states state regulation has proved successful, that in each of these states the welfare of the people has been promoted and against none of these commissions has at any time a word of suspicion been had as to their operation. He attacked municipal ownership and operation as fundamentally wrong and stated it was inherent that such regulation should be or would become politically affected and voiced a protect against the state giving to any locality the right of local regulation.

Dr. William J. Sheflin, president of the Citizens' Union of the city of New York, stated the measure might properly be entitled "A bill to give more power to the Mayor in transit matters who has obstinately refused to use the power he already has." The administration of buses at the present time in the city of New York was cited as an example, that the Mayor seeks power to establish municipal bus lines, when under the present law such lines can now be established by the granting of certificates of authority and then obtaining of certificates of convenience and necessity from the public service commission. He charged that the Merchants Association had employed an expert committee to study and report upon the plans of the Transit Commission and those of the Mayor and that this report shows that the plan suggested by the Mayor would be not only expensive and extravagant but would result in worse crowding in the subways than is experienced at the present time. He attacked the Mayor for not cooperating with the present transit commission in putting into effect the plan it has prepared. He concluded his remarks with the statement that some people say: "Go ahead and give Mr. Hylan all the rope he wants and he will hang himself" This would be a very dangerous thing to do because that rope might cost the people $150,000,000 to $200,000,000.

Perhaps the star speaker of the opposition was Bernard M. Wallstein, of the Citizens Union, who agreed that a number of provisions of the bill are good ones, but attacked the measure from the standpoint of the city being called to regulate utilities of which it would itself be a party to the action.

Points Made by Opposition to New York City Bill

Opponents of the measure argued that:

1. It would be unconstitutional to delegate legislative power to the Board of Estimate, as the city would be a principal in all matters in dispute.
2. Legislative authority should not be delegated to a body not responsive or responsible to the Legislature.
3. The entire transit problem would be speedily solved if the Hylan administration would cooperate instead of playing politics.
4. It would create a commission of puppets or rubber stamps for the Hylan administration.
5. All other public improvements would be blocked because of the tremendous cost of municipal operation.

Claims Made for New York City Bill

Supporters contended that if enacted into law, the bill's results would be:

1. Partial solution of the New York transportation problem in sixty days.
2. An end to the agitation over transit and adequate transit facilities for New York.

He also attacked the probable personnel of the commission or body which might be appointed by the Mayor. He laid much emphasis on the fact that Governor Smith in 1920 vetoed a similar measure which would have given to the city of Buffalo regulation of certain of its own utilities because it delegated state sovereignty, which is inviolate and which should not be delegated by the Legislature to any municipality.

Alfred T. Davidson, representing the owners of the property of the Third Avenue Railroad System, attacked the bill as anarchistic and unrivalled by anything produced in Socialistic Russia. He brought out the point that the surface railways carry 43 per cent of all traffic in the city of New York; that it is the intent of the bill to confer authority upon the city of New York to scrap all of these lines.

Mr. Davidson brought out that there is a legal way to operate buses in New York city when they are really needed, but that the city has continued by illegal means to attempt to operate bus lines where such lines are not needed; that the Third Avenue system has applied and waited for two and one-half years for permission to operate buses on the Concourse in the Bronx without success. He also attacked the bill as confiscatory to the surface lines particularly the provision which allows the commission the power of removal and relocation of tracks and expressed the fear that the city would exercise its powers in such a way as to first ruin the property of the companies and then buy it in at the depreciated figure.

Mayor and Comptroller Speak

Raymond B. Ingersoll of the City Club went on record as being absolutely against city control of its public utilities as being unsafe and dangerous. He objected to the organization plan, the uncertainty of the personnel and of the powers and duties intended to be conferred under the bill and expressed hope that the present Transit Commission be continued. He criticised the drafters of the bill for failure to make any provision for public hearings and discussion before important steps involving the expenditure of millions of dollars might be taken under it and called attention to the apparent conflict between many of the provisions of the bill. He also brought out a joker in section 86 of the bill which states the rate of fare to be charged shall not exceed 5 cents per person for one continuous ride, "except by special authorization of the Board of Estimate and Apportionment," and charged that the latter wording would permit of a 10-cent fare if such body was disposed to exact it.

Mayor John F. Hylan was the first speaker for the bill. He said that if the Walker-Donohue bill is passed the city will give to the people a transit program that will serve the people and not the interests of those who want to get the profit out of the nickle. Mr. McCarroll is very much in fear of the bondholders and property owners not being properly treated, said the Mayor. The city has invested about $300,000,-

000 in subways and the profit has all gone to the traction interests. "What we are desirous of getting," said the Mayor, "is a little of that profit and if possible manage some of the property which the city owns."

The Mayor said the present Transit Commission has cost the city of New York more than $4,000,000 and had done nothing. According to him the enactment of the Walker-Donohue bill would mean that the city of New York could start construction at once and new municipal buses operating over fifty routes at a 5-cent fare could be on the streets before next summer. The Mayor charged that the time of the Transit Commission had been devoted to the concoction of a scheme to unload millions of dollars of worthless traction lines on the city of New York.

The Mayor scouted the idea that the city is financially unable to proceed with the building of its own subways and transit facilities, stating that $40,000,000 a year of construction is all that it is physically possible to do. This amount is entirely within the financial ability of the city. The Mayor argued at length that if bridges, water supply and other public works could be administered by the city with economy, the city could operate its own transit facilities to advantage.

Charles L. Craig, Comptroller of the city of New York, went quite thoroughly into the history of interference by the Legislature with the street car interests of the city of New York, going back to the year 1860 when the Legislature took away from the city of New York the right to grant franchises for the use of its streets and issued by legislative enactment a number of perpetual franchises which it had the timerity to pass over the then Governor's veto. He stated that the legislation now asked was only a restoration of power formerly vested in the city.

Other speakers for the measure were: Murray Hulburt, President of the Board of Aldermen; Edward Riegelman, Borough President of Brooklyn; F. L. La Guardia, former President of the Board of Alderman; Maurice Connolly, Borough President of Queens; George Nicholson, Corporation Counsel of the city of New York, and Edward Flynn, Sheriff of Bronx County.

It is expected the bill will be passed in the Senate some time next week. Its fate in the Assembly will depend upon how many up-State Republican votes can be mustered in its favor. It would appear to have much more of a chance of passage than any other of the so-called administration measures.

Bond Issue for Improvements Fails for Second Time

The proposed bond issue of $5,000,000 for making extensions to the Detroit municipal street railways and buying new equipment failed for the second time to receive the necessary 60 per cent of the votes when placed on the March 7 primary election ballot. According to a count of the ballots, the number of favorable votes was 49,877, with 36,230 negative votes, giving a majority of approximately 58 per cent in favor of the project. The City Council has voted unanimously to put the bonding proposition on the ballot again for the April 2 election. The placing on the ballot of the proposition to bond for $12,000,000 for the city's new municipal lighting plant has also been voted by the Council. These steps have been taken in spite of the action by the State Legislature delaying the Culver bill providing for raising Detroit's bonding limit. It is pointed out that if the bill fails to pass the Legislature, the city's increased valuation this year will provide for additional bonds to the amount of $3,000,000 to $4,000,000. The municipal lighting plant would be used as a source of additional power for the street cars.

Bill to Abolish Commission Fails.— The bill proposed in the Utah Legislature abolishing the State Utilities Commission and others proposing various changes in the commission failed of enactment. The Legislature adjoined on March 8.

Trackless Trolley Requested

The Philadelphia (Pa.) Rapid Transit Company on March 8 asked the city for authority to operate a trackless trolley line on Oregon Avenue, between Eighteenth Street and Delaware Avenue. Councilman Gaffney introduced the ordinance in Council at the request of the company. It was referred to the Councilmanic committee on transportation and public utilities.

The present fare would prevail on the proposed route, with free transfers to intersecting lines. Recently Thomas E. Mitten said the company planned such a line. As explained previously in the ELECTRIC RAILWAY JOURNAL, the Pennsylvania Rapid Transit Company has been organized as an underlying company to operate the new line.

The ordinance also gives the company the right to build on Sixteenth, Seventeenth, Wolf and Jackson Streets, in order to reach the carhouse at Sixteenth and Jackson Streets. It provides the lines shall be in operation within a year after the issuance of a certificate of public convenience from the Public Service Commission.

Foreign News

$500,000 for Power Improvement

In anticipation of the opening of the extensions of the London Underground Railways now under construction, a contract has been placed for a 15,000-kw. turbo-alternator for the power station at Chelsea. The turbine will be constructed by C. Parsons & Company and the alternator by the Metropolitan-Vickers Electrical Company. The cost will be £53,000, exclusive of condensing plant, the contract for which has yet to be placed. Other improvements at Chelsea will cost £47,600, so that more than £100,000 is about to be spent on the Chelsea equipment. The total capacity of the station will then be 93,000 kw.

To accelerate the speed at which tickets are issued at London Underground Railway booking offices, the company has been experimenting with "Roltio" ticket-issuing machines for some time at a number of busy stations. These machines are prepared to a design of the underground railways and they almost instantaneously space, date and issue the ticket to the passenger. In tests as to the speed of booking passengers, the best result obtained so far was 1,174 tickets issued in an hour. In that hour, change had to be given to 492 passengers. Roll tickets are used at a cost of only half the price of card tickets. Further, when 1,000 tickets have been issued, the roll is replaced, whereas card ticket cases have to be refilled after the issue of 250 tickets. Another successful experiment has been a 1½ d. slot ticket machine electrically connected to the passimeter. When a passenger inserts his money in this machine he obtains as usual a dated and canceled ticket and the passimeter unlocks automatically so that he may pass through.

Lord Ashfield, chairman of the London Underground Electric Railways and the London General Omnibus Company, has been holding forth to representatives of the London daily press on the iniquity of allowing small companies to run buses in competition with the general company's services. He professes not to object to genuine competition, but to the fact that these small concerns run only on the most congested and remunerative routes, while his company, in the public interest, provides services on unremunerative routes. The sponsor of one of the small companies has replied hotly. Among other things he points out that a few days after he instituted a service on a crosstown route where there were practically no facilities the London General swamped the business by putting on a great number of buses in competition.

It has also been pointed out by the tramway interests that the London General carries on absolutely unregulated competition with the various metropolitan tramway undertakings. On some routes during the rush hours the tramways can carry all the traffic so that the buses are quite unnecessary. The latter would probably not be run on tramway routes were it not for the gold mine which the buses find in the city and the West End where no tramways are allowed.

Financial and Corporate

Traffic and Earning Figures Compared

Loss in New York City Only $2,043,760 in Year 1922 Compared with $16,914,256 in 1921

The gross traffic of the street railroad companies under the jurisdiction, of the New York Transit Commission as presented in the report of that body to the Legislature for 1922 shows an increase for the year of 98,404,521, to which there may be added the increase upon the routes operated by the Fifth Avenue Coach Company, making a total increase of more than 100,000,000. This does not include any traffic upon steam railroad lines, nor upon the electrically-operated divisions of such roads.

Numerically the greatest increase shown was upon the surface lines of Brooklyn, the figures of the Brooklyn City Railroad and of two small and relatively unimportant lines, being combined with those of the B. R. T. system. This Brooklyn increase was 54,431,425. While indicating very great traffic increments, this high figure is in part accounted for by the fact that on the Brooklyn lines, during the preceding fiscal year there was a disastrous strike, resulting in the continued cessation of operation of several lines and a reduction of the totals upon practically all below the normal figure which might have been expected. For the same reason, as they were also affected by the strike, the B. R. T. rapid transit lines showed a traffic gain for 1922 of 39,776,589.

A marked change was reported in respect to the figures of the Interborough Rapid Transit Company. In recent years, with each annual report, the subway and elevated lines of this system have shown substantial and in some instances, remarkable gains in traffic. The past fiscal year, however, revealed a remarkable reduction in the rate of increase upon the subway lines of this company, with a total traffic of 644,975,474, which was an increase of only 5,589,694 over the previous year, in which year the increase over 1920 was more than 53,000,000. Some subway routes of the Interborough showed an actual traffic loss. Still more remarkable was the decrease upon the Interborough elevated lines, where the traffic fell 25,775,835 below the 1921 figure. The year previous had shown a slight gain. The Interborough's elevated loss is difficult to explain, save in one instance, where the Sixth Avenue line, closely paralleled by the Broadway subway of the B. R. T., lost nearly 11,000,000, while the Brooklyn company's subway line gained more than 15,000,000 passengers. It is also believed that a part of the loss is represented by a diversion, through preference for travel by subway, of many former elevated passengers to the Interborough's underground lines.

The Hudson and Manhattan tubes, with a gain of 3,497,244, maintained the approximate rate of growth which has prevailed upon its lines for several years.

Surface line traffic in all boroughs showed gains, that in Manhattan being the least, with 1.10 per cent, while the Borough of Richmond, semi-suburban community, had the highest, with 17.53 per cent. This is to be explained by the fact that the Staten Island Midland trolley lines were in operation only a portion of the year during 1921. The gain upon all rapid transit lines, a little more than 23,000,000 passengers, was at the rate of 1.52 per cent. Upon surface lines the gain was 7.70 per cent. The combined gain, for all lines, was 3.95 per cent.

As the commission views it, the combined financial situation of the street railroad companies showed a healthy improvement, leading to the hope that the current fiscal year, unless unforeseen conditions arise, will end with a balance on the right side of the traction ledger. While net corporate income for the fiscal year 1922 shows a deficit of $2,043,760, the measure of improvement is indicated by the deficit of 1921 which was $16,914,256. In the year previous the deficit was about $10,700,000, and 1919, more than $8,500,000, a combined deficit for the three previous

FINANCIAL RESULS OF OPERATION

The accompanying tables show (1) the number of revenue passengers reported by the several systems, the estimated population of the city of New York and the average number of rides per capita for the fiscal years 1920, 1921 and 1922; (2) the street railway traffic for 1860, 1870, 1880, 1890, 1900, and for every year from 1910 to 1921, inclusive; (3) the results of operation, from the financial standpoint, from the year 1908 to the year 1922, inclusive.

STREET RAILWAY TRAFFIC IN NEW YORK CITY, 1920-1922
Number of Revenue Passengers (Cash Fares)

	Fiscal Year Ending June 30			Increase* of 1922 over 1921	
	1920	1921	1922	Number	Per Cent
Subway and elevated lines:					
Interborough—					
Subway	586,098,633	639,385,780	644,975,474	5,589,694	0.87
Elevated	369,034,477	374,293,051	348,517,216	D25,775,835	D6.89
B. R. T. elevated and subway	376,782,635	404,970,640	444,747,229	39,776,589	9.82
Hudson and Manhattan tubes	92,250,836	95,607,645	99,104,889	3,497,244	3.66
Total	1,424,166,581	1,514,257,116	1,537,344,808	23,087,692	1.52
Street surface lines in:					
Borough of Manhattan	349,772,761	384,128,024	388,357,767	4,229,743	1.10
Borough of the Bronx	94,141,991	107,675,507	114,679,520	7,004,013	6.50
Borough of Brooklyn	432,936,227	418,106,603	472,538,028	54,431,425	13.02
Borough of Queens (a)	49,562,574	51,944,034	58,826,451	6,882,417	13.25
Borough of Richmond	15,007,235	15,797,894	18,567,125	2,769,231	17.53
Total	941,420,788	977,652,062	1,052,968,891	75,316,829	7.70
Grand total	2,365,587,369	2,491,909,178	2,590,313,699	98,404,521	3.95
Population (b)	5,620,048	5,705,364	5,790,680	.....	.....
Fares per capita	421	437	447	.....	.....

* The prefix D indicates decrease. (a) Exclusive of Brooklyn Rapid Transit. (b) Estimated for 1921 and 1922 on basis of one-tenth of decennial increase, 853,165.

RESULTS OF OPERATION OF STREET RAILWAY COMPANIES NEW YORK CITY
Years ended June 30, 1908-1922

Fiscal Year	Street Railway Operating Revenue	Expenses of Maintenance and Operation	Taxes, Tolls, etc.	Operating Income (a)	Net Corporate Income (b)
1908	$69,026,613	$41,305,058	$4,330,228	$23,391,327	$2,665,765
1909	72,432,714	41,461,172	5,007,159	25,813,683	6,385,998
1910	79,593,910	43,586,932	5,148,324	30,858,654	9,559,816
1911	83,751,415	45,993,964	5,495,881	32,261,570	10,171,074
1912	88,242,144	47,667,562	5,803,790	34,770,792	11,893,641
1913	92,141,605	48,675,647	6,095,520	37,370,438	11,797,771
1914	94,155,521	50,117,712	5,895,935	38,141,874	11,849,985
1915	93,644,428	50,324,095	5,811,290	37,509,043	11,501,157
1916	98,628,185	52,038,312	6,238,461	40,351,412	12,352,438
1917	100,185,796	55,960,722	7,185,113	37,039,961	9,457,886
1918	103,499,463	60,699,402	8,232,851	34,567,210	5,266,496
1919	110,198,575	75,985,007	7,907,358	26,306,210	Loss 8,556,408
1920	127,880,161	96,059,603	7,353,757	24,466,801	Loss 10,725,522
1921	136,805,038	107,232,966	7,505,676	22,066,396	Loss 16,914,256
1922 (c)	141,236,944	96,320,951	8,544,895	36,371,098	Loss 2,043,760

(a) Excess of revenue over expenses and taxes. (b) Balance after interest, rents and other fixed charges (c) Provisional.

STREET RAILWAY TRAFFIC (INDICATED BY NUMBER OF CASH FARES) IN NEW YORK CITY, 1860-1922

Year	Surface Railways	Rapid Transit	Grand Total	Per Capita
1860	50,830,173	.....	50,830,173	43
1870	152,463,920	.....	152,463,920	103
1880	229,585,272	60,831,757	290,417,029	152
1890	331,243,531	237,906,029	569,149,560	218
1900	603,788,366	242,564,692	846,353,058	246
1910	763,140,739	768,122,175	1,531,262,914	321
1911	805,619,547	798,281,850	1,603,901,397	331
1912	843,539,783	837,374,152	1,680,913,935	340
1913	901,443,411	868,433,097	1,769,876,508	352
1914	916,205,060	896,999,296	1,813,204,356	355
1915	918,752,149	888,880,577	1,807,632,726	348
1916	944,591,698	954,143,917	1,898,735,615	360
1917	860,165,633	1,058,646,596	1,918,812,229	358
1918	869,997,143	1,105,514,646	1,975,511,789	362
1919	875,678,033	1,204,266,264	2,079,944,297	376
1920	941,420,788	1,424,166,581	2,365,587,369	421
1921	977,652,062	1,514,257,116	2,491,909,178	437
1922	1,052,968,891	1,537,344,808	2,590,313,699	447

years of more than $36,000,000. These deficits, preceded by several years of decreasing income, serve to indicate the serious financial situation under which the operating companies have been laboring and the difficulty which has faced them in the attempt to justify new capital issues, from which to obtain funds for greatly needed expenditures for new rolling stock and other equipment to meet the demands of a growing traffic.

They have also served to make more difficult a favorable response to the commission's persistent demands for improved service, as more cars and more trains generally indicate increased operating expenses. Strict economy, however, has enabled the companies to reduce their operating expenses during the year, in which effort they have had the assistance and co-operation of the commission as far as was consistent with the just demands of the traveling public for adequate service. Operating revenue increased during the year about $4,431,000, operating expenses decreased $10,912,000, and thus, while taxes increased about $1,000,000, street railway operating income increased approximately $14,307,000.

Ohio Road Abandons Service

The Newark & Granville Electric Railroad, a branch of the Columbus, Newark & Zanesville Traction Company, ceased giving service at midnight on March 10 on authority of the Ohio Public Utilities Commission after the company had presented evidence showing the branch to be operating at a loss, due mainly to motor bus and automobile competition.

On Dec. 21, 1889, the first car was run over the line but only as far as the city limits in Newark. A year later service was carried through to Granville.

Improvement in 1922 Earnings

The report of the Rochester & Syracuse Railroad, Inc., Syracuse, N. Y., showed a substantial gain in earnings last year. The company earned twice its bond interest and, after the payment of 4 per cent on preferred shares, had a surplus of $28,300, compared with $3,619 for the previous year.

The gross earnings of the company were $1,055,272 and operating expenses $747,163. Taxes amounted to $68,096. Non-operating revenue was $11,782 and the gross income $251,796. Bond interest amounted to $125,555, with $126,241 to be applied to dividends. Preferred stock dividends took $97,940, leaving a surplus of $28,301.

Revenue Passengers on City Lines in Fort Wayne Increase

Fare-paying passengers on the Fort Wayne, Ind., car lines increased more than a million and a half during 1922 from the figure for 1921, according to a report released by General Manager S. W. Greenland of the Indiana Service Corporation. The number of passengers carried on the interurban lines of the company decreased more than 63,000, it was shown. During 1922 the total number of fare-paying passengers carried on the Fort Wayne city lines amounted to 18,747,084. In 1921 the total number was 17,199,663. The total number of revenue passengers carried on the interurban lines in 1922 was 1,140,888, while in 1921 the total was 1,204,143.

The car mileage in Fort Wayne was considerably greater in 1922 than in 1921. The car mileage covered in 1922 was 3,504,248, while the car mileage covered in 1921 was 3,288,691. The interurban mileage also showed an increase, the mileage for 1922 being 1,164,979, while for the previous year it was 1,127,286.

$481,688 Net Earned Since Receiver Was Appointed

The net income of the Denver (Colo.) Tramway from Dec. 24, 1920, the date of the appointment of the receiver, to Jan. 31, 1923, was $481,688. No annual or monthly reports covering the operation of the property have been prepared or printed for distribution since the receiver was appointed. The figures covering the period mentioned, shown in detail in the accompanying table, were transcribed from the records filed by the company in the office of the Federal District Court.

Preferred Shares Participate

At a meeting of the board of directors of United Light & Railways Company, Grand Rapids, Mich., held on March 8, the following dividends were declared:

A regular quarterly dividend of 1¾ per cent on the 6 per cent first preferred stock of the company, payable April 2.

A regular quarterly dividend of 1¾ per cent on the participating preferred stock of the company, payable April 2.

An extra dividend of 1 per cent on the participating preferred stock, payable in quarterly installments on April 2, July 2, Oct. 1, 1923, and Jan. 2, 1924.

A special dividend of 5 per cent on the common stock of the company, payable in common stock, on April 2, 1923.

A regular quarterly dividend of 1¾ per cent and an extra dividend of one-half of 1 per cent on the common stock of the company, payable in cash May 1.

The board announces that it is its intention from time to time to make disbursements of special dividends on the common stock of the company in the form of stock whenever the surplus of the company warrants it.

The board further announces that all stockholders of the company will be offered an opportunity in the near future to acquire additional holdings of common stock and participating preferred stock at attractive prices, as it will be the policy of the company to raise a portion of its financial requirements for development purposes by the sale of its capital stock to its stockholders and to its employees.

CONDENSED STATEMENT OF NET INCOME OF THE DENVER TRAMWAY COMPANY FOR THE PERIOD FROM DEC. 24, 1920, TO JAN. 31, 1923

Classification	Accumulative 12–24–20 to 12–31–22	January 1923	Accumulative 12–24–20 to 1–31–23
Passenger	$9,483,992	$400,683	$9,884,676
Parlor, chair and special car	5,441	168	5,609
Mail	3,324	144	3,466
Express	4,724	148	4,873
Switching	18,449	880	19,329
Total revenue from transportation	$9,515,930	$402,023	$9,917,953
Revenue from operations other than transportation			
Station and car privileges	$41,903	$1,791	$43,697
Rents of tracks and terminals	70,653	2,500	73,152
Rents of equipment	45,489	1,947	47,437
Rents of buildings and other property	83,584	3,571	87,155
Power	70,317	2,898	73,215
Miscellaneous	490	33	521
Total revenue from operations other than transportation	$312,436	12,740	325,177
Total operating revenue	$9,828,367	$414,763	$10,243,131
Operating expenses:			
Way and structures	$1,362,032	$45,798	$1,407,831
Equipment	920,855	37,923	958,779
Power	724,400	35,365	759,768
Conducting transportation	2,863,784	118,463	2,982,248
Traffic	4,547	89	4,630
General and miscellaneous	689,818	27,770	717,589
Total operating expenses	$6,565,436	$265,408	$6,830,845
Net operating revenue	$3,262,931	$149,355	$3,412,286
Miscellaneous income:			
From securities and accounts	$23,679	$1,095	$24,774
Total miscellaneous income	$23,679	$1,095	$24,774
Gross income less operating expense	$3,286,609	$150,450	$3,437,060
Deductions from income:			
Taxes	$757,166	$32,117	$789,283
Franchise payments	121,210	5,000	126,210
Interest on funded debt	1,947,743	79,674	2,022,418
Interest on floating debt	17,461	.....	17,461
Total deductions from income	$2,838,580	$116,791	$2,955,372
Net income	$448,029	$33,658	$481,688

Net Up 41.51 per Cent

Milwaukee Company Another Utility that Made Excellent Showing in Year 1922

The net income of the Milwaukee Electric Railway & Light Company, Milwaukee, Wis., for the year 1922 was $1,418,671. This is an increase of 41.51 per cent over that for the year 1921. Operating revenues of the railway department amounted to $9,721,909, an increase of 1.55 per cent over 1921. Operating revenues of the electric and heating departments amounted to $9,648,515, an increase of 11.28 per cent over 1921.

Capital expenditures during the year amounted to $5,459,081. The principal items were as follows:

Railway	$3,457,491
Electric	859,763
Heating	11,024
Street lighting	11,902
Power	659,179
Miscellaneous	483,525

More than $93,000 of property was withdraw from service during the year.

Expenditures in the railway utility include the acquisition by purchase of ninety-nine city cars and forty one-man safety cars heretofore leased from the Wisconsin General Railway under agreement dated Oct. 1, 1920, the purchase of a small railway line from the Milwaukee Northern Railway and the purchase and acquisition of a fleet of buses operated in interurban service.

INCOME ACCOUNT OF MILWAUKEE ELECTRIC RAILWAY & LIGHT COMPANY FOR 1922

Operating revenues		$19,370,424
Operating expenses:		
Ordinary operating expenses	$12,478,062	
Depreciation (Reserve credit)	1,558,918	
Taxes	1,326,869	
Total operating expenses		$15,363,849
Net operating revenues		$4,006,575
Non-operating revenues		122,587
Gross income		$4,129,162
Interest charges:		
Interest on funded and unfunded debt	$2,330,159	
Interest on depreciation reserve balances	334,095	
Interest on other reserve balances	46,237	
Total interest charges		$2,710,491
Net income		$1,418,671

John I. Beggs, president, explains that in view of the lower interest rates prevailing, the company called for redemption $4,950,000 refunding and first mortgage 7½ per cent bonds, series A, dated June 1, 1921, due June 1, 1941; $2,000,000 three-year 7 per cent secured gold notes, dated May 1, 1920, due May 1, 1923, and $872,000 ten-year 8 per cent sinking fund equipment trust gold certificates, dated Oct. 1, 1920, due Oct. 1, 1930. In order to refund these securities and provide funds for the retirement of floating debt incurred for construction expenditures and for further construction requirements, the directors authorized an issue of $12,500,000 refunding and first mortgage 5 per cent bonds, series B, which bonds were sold under favorable market conditions. This will result in a substantial interest saving. On July 1, 1922, $150,000 of 5 per cent serial notes matured and were paid.

During the early part of the year the company sold the balance of $1,338,100 preferred capital stock, issue of 1921, 8 per cent series, which brings the total amount of this series up to $3,000,000, the authorized amount.

On April 17, 1922, the directors authorized the issue and sale of an additional $3,000,000 par value of the new preferred capital stock, issue of 1921, 7 per cent series. The stock is offered for sale at par by the company direct to its customers and the residents of the territory served by it. Up to Dec. 31, 1922, $1,267,500 of this stock had been sold at par, for cash, and $642,600 on installment payment plan, on which payments had not been completed.

Common capital stock in the amount of $1,400,000 was issued at par in payment of balance due Milwaukee Light, Heat & Traction Company on account of the acquisition of the operating property of that company.

In submitting the printed report to its preferred stockholders the company inclosed with it a copy of an advertisement published in answer to an intended legislative inquiry. The documents give ample proof that the business of the company is growing rapidly and that it is keeping pace with a constant increase of demand for its services. For the benefit of the stockholder it is explained that the company obtains its new capital, so far as possible, from investors at home by selling, with the State's approval, its preferred shares. On Dec. 31, 1922, the company had 7,000 paid-up preferred shareholders, with several thousand more who are buying shares on monthly payments. The company then says to the shareholder:

When you bought our 8 per cent or our 7 per cent preferred shares you made sure of permanent income from your money at a rate well above the interest average now and for many years to come. If you have surplus funds for investment, we advise you to increase your holdings of 7 per cent preferred shares, while the opportunity is still available. We shall be glad to have you, as a shareholder, recommend these shares, now on sale, to any of your friends who may be looking for a safe investment paying a good income rate.

Facts for the Legislature and for Milwaukee Electric Railway & Light Co. Shareholders

The state assembly a few days ago asked the Railroad Commission to supply the speaker with the following information: Total outstanding bond and stock issues of Wisconsin public utilities, and approximate annual interest and dividends paid on each issues.

Speaking for itself only, Milwaukee Electric Railway & Light Co., Wisconsin's largest public utility, gives below the answers to these questions, for the information of the legislature, and of our customers and our investors throughout the state.

VALUE OF THE COMPANY'S PUBLIC SERVICE PROPERTY

Physical property (State appraisal of 1914), with additions to Dec. 31, 1922	$60,017,643
Working capital, materials and supplies, same date	3,756,768
Total	$63,774,411

SECURITIES OUTSTANDING (As of Dec. 31, 1922.)

Bonds:		
First consolidated	$ 6,500,000	
Refunding and extension	6,726,000	
General and refunding	5,819,000	
Refunding and first	12,500,000	
M. L., H. & T. Co. first	5,000,000	
* Total bonds	$36,547,000	$36,547,000
Notes:		
Serial gold notes	$ 550,000	
Secured gold notes	3,600,000	
Total notes	$ 4,150,000	$ 4,150,000
Preferred stock:		
6% shares	$ 4,500,000	
7% shares	1,267,500	
8% shares	2,737,500	
Total preferred stock	$ 8,504,800	$ 8,504,800
Common stock		$11,250,000
Total outstanding capitalization, Dec. 31, 1922		$60,451,800
Excess of property over capitalization		$ 3,324,611

*(Cash has been set aside to pay off $872,000 of our trust certificates coming due April 15, 1923, cancelling that item of bonded debt.)

INTEREST AND DIVIDENDS, 1922.

Average rate required for interest and discount on the $40,697,000 of bonds and notes was a shade over five and one-half per cent—the exact figure being 5.523 per cent.

Dividends on preferred shares were paid at rates indicated above.

Dividend on common stock amounted to $921,500—at the rate of 8.19% on $11,250,000 outstanding.

Actual net income earned during 1922 for interest and dividends was a trifle over six and one-half per cent—the exact figure being 6.569%. This was much less than the 7½ to 8% "reasonable return" sanctioned by state policy.

RELATION OF CAPITALIZATION TO ELECTRIC SERVICE RATES

The gentlemen who offered the assembly resolution stated their belief that the large yearly increase in public utility capitalization lays a steadily increasing burden upon public utility customers in city and country. As regards the customers of Milwaukee Electric Railway & Light Co., the gentlemen were in error. Increase of investment, serving each year thousands of additional customers, has resulted in a steady decline in the cost of electric energy during the seventeen years of Railroad Commission regulation of the public utility business. Here are the figures:

Year	Capitalization at end of year	Average Charge per Kilowatt hour for all energy sold
1905	$24,361,405	6.00 cents per kwh
1910	37,791,905	4.39 cents per kwh
1915	43,883,000	2.44 cents per kwh
1920	45,937,000	3.29 cents per kwh
1922	60,451,800	2.91 cents per kwh

The company's growth during the past two years was swift and large. A large part of the $14,500,000 of new capital needed to finance that growth was supplied by Wisconsin investors, who are now drawing regular interest and dividends on their investment. During 1922 the company gained over 14,000 new electric service customers, and over 11,000 new Wisconsin shareholders.

A SAFE 7% INVESTMENT

The company is now selling, with the state's approval, the last $500,000 of a $3,000,000 issue of 7% cumulative preferred shares. The price is $100 per share. You can buy them either for cash or on monthly payments of $5 or more per share. Either way, you get 7% on every dollar invested, from the start. Mail orders for these shares are filled promptly by registered letter.

Securities Department
THE MILWAUKEE ELECTRIC RAILWAY & LIGHT CO.
Public Service Bldg. Milwaukee, Wis.

Reproduction of Advertisement Sent to Stockholders

Net Income of Pittsburgh Railways Increased in 1922

An accounting of the assets and liabilities of the Pittsburgh (Pa.) Railways asked by the United States District Court on Feb. 15 as the first step toward the reorganization of the company was filed on March 6 in the court by the receivers, C. A. Fagan, W. D. George and S. L. Tone.

The report shows a falling off in total receipts for the year 1922 as against 1921 of $199,965, but the net income for 1922 is shown to be $166,339 more than the net income of 1921, an increase which is attributed to economies introduced in the service. The coal strike and business depression in 1922 are given as causes for the decrease in total revenues, which is also indicated in the fact that 627,967 more passengers were hauled over the lines the year before.

Out of $21,169,750 received in operating revenues last year, $16,669,846 was expended for operating expenses, a decrease of $188,570 from 1921. Much of the decreased cost of operation is in the maintenance bill which the receivers account for in the betterment of track and equipment. The continued appro-

priation of portions of the revenues for modern equipment and better roadbeds is recommended by the receivers as a means to further economies.

In 1922 the company paid out $3,482,437 in fixed charges, interest on bonds, mortgages and rentals as against $3,720,463 the year previous, a decrease of $238,025.

The net liabilities of the company on Dec. 31, 1922, were $8,087,000, according to the report. Current and accrued liabilities totaled $12,159,000, but from this total was subtracted $4,072,000 included in current and working assets to give the net figure. The outstanding unpaid liabilities are largely injury and damage claims, taxes and municipal charges.

The comments of the receivers contained in the detailed report were republished as a full-page paid advertisement in the Pittsburgh *Gazette* and other papers. From a typographical standpoint, the ad, considering the extent of the text, was admirably displayed.

Makes Report on Railway Properties

The Dominion Power & Transmission Company, which controls and operates the electric railways in Hamilton and Dundas, Ont., has submitted its annual report for 1922. The company sees a tendency toward improvement out of the adverse war conditions, but its railway properties have experienced little relief from their problems. The report states that the Hamilton & Dundas Street Railway is planning on a change in fare with a view toward keeping in business. It had contemplated the necessity of going out of business.

The statement refers to an issuance of bonds amounting to $100,000 and bond redemption equaling $224,000. The total of the company's reserve and profit and loss account has been increased by the sum of $276,381. bringing that total to the sum of $3,616,462.

Reorganization Plan Being Prepared

Plans are under way to release the New York (N. Y.) Railways from receivership instituted March 20, 1919. The Chase Securities Company and two large insurance companies are said to be back of the plan.

The proposed reorganization would continue the consolidation of the lines now controlled by the receiver, Job E. Hedges, but would leave out of considertion the three lines which have already been restored to independent operation viz.: The Eight Avenue Company, the Ninth Avenue Company, and the Fourth & Madison Avenue Line.

One of the burdens carried by the New York Railways has been in the form of rents to its subsidiary companies. Under the reorganization plan the rentals probably will be scaled down and the lines put into condition to insure efficient operation.

Railway Securities at Auction

Electric railway securities sold by Adrian H. Muller & Son on March 14 at the Public Auction Room, 14 Vesey Street, New York, were as follows:

$5,000 Columbus, Buckeye Lake & Newark Traction Company 5 per cent bonds, certificate of deposit, 2 per cent.
800 shares Denver & Northwestern Railway $5.75 a share.
$157.14 reorganization committee certificate, Series "A," Chicago Electric Traction Co., representing an undivided beneficial interest in first mortgage 5 per cent gold bonds of Chicago & Interurban Traction Co., interest paid to Jan. 1, 1922. $26 lot.

Will Pay Another Dividend. — The Brazilian Traction, Light & Power Company has declared a 1 per cent dividend payable on the common stock for the first quarter of 1923. This is the third declaration since the resumption of dividends. The company's monthly statements have shown steady increases in earnings.

Sale Authorized.—Authority to sell the transmission line of the Ohio Power Company, now owned by the Fort Wayne, Van Wert & Lima Traction Company and extending from Lima to Wapakoneta, Ohio, for $14,000, was given by Federal Judge Killits, Toledo, to Henry C. Paul, receiver of the traction company, on Feb. 26.

Gold Bonds Offered.—Drexel & Company, Philadelphia, Pa., are offering at 97 and interest, to yield nearly 6.25 per cent, $3,000,000 of the Georgia Railway & Power Company, Atlanta, Ga., twenty-five year general mortgage gold bonds. The bonds, known as the 6 per cent series of 1923, are dated March 1, 1923, and are due March 1, 1948.

Mr. Mitchell Chairman of the Board.—S. Z. Mitchell, president of the Electric Bond & Share Company, New York, N. Y., has been elected chairman of the board to fill the vacancy caused by the resignation of Marsden J. Perry. Mr. Mitchell will continue to serve also as president. F. B. Odlum and Frank Silliman, Jr., have been elected vice-presidents of the company.

St. Louis & Jennings Railroad Sold.—The St. Louis & Jennings Railroad, an electric line operating between St. Louis and Jennings, Mo., was sold on March 7 to W. J. Stedelin, St. Louis. The road was built in 1911 to aid in opening up several subdivisions in the district through which it travels and has been in continuous operation ever since. In August, 1922, it was placed in the hands of a receiver due to its failure to meet certain interest payments. Mr Stedelin says that the road will be continued in service.

Recommends Change in Fixing Allowances. — Street Railway Commissioner Engle of Youngstown, Ohio, at the first meeting of the street railway committee of the Council, advocated a change in the method of fixing operating and maintenance allowances for the Youngstown Municipal Railway, saying they should be regarded merely as budgets and changed from time to time to conform with new conditions. He said no large surplus or deficit should be permitted to accumulate in any item of allowance.

Preferred Stock Offered.—A syndicate headed by the Southern Trust Company, Houston, Tex., is offering at 100 and interest $500,000 of the 7 per cent cumulative participating preferred stock of the Seaboard Electric Railway of Texas. The stock is callable all or in part as the directors may determine at 105 and dividends. After the payment of 7 per cent on the common stock the preferred stock will participate equally with the common stock in all further dividend payments. The purpose of the issue is to advance money for the construction of the interurban railway to Pasadena.

Prior Preference Stock Offered.—Stone & Webster. Boston, Mass., are offering $2,000,000 of the 7 per cent cumulative prior preference stock of the Puget Sound Power & Light Company, Seattle, Wash. The price is 103 and accrued dividend to yield 6.80 per cent. The stock will be redeemable at 110. Dividends will be payable Jan. 15 and quarterly. The proceeds from the sale of this issue will be applied against the recent purchase of the Washington Coast Utilities and North Coast Power Company and for the construction of transmission lines connecting with these properties.

Prior Preference Stock Offered.—A syndicate headed by the National City Company, New York, N. Y., is offering $1,000,000 of 7 per cent cumulative prior preference stock of the Portland Railway, Light & Power Company, Portland, Ore. The price is 98 and accrued dividends yielding more than 7⅛ per cent. The proceeds from the sale of the stock, together with the recent bond financing, will reimburse the company for construction expenditures. A block of the stock was offered by the company to residents of Portland. In offering this the company called attention to the fact that "the stock is an investment in a $60,000,000 Home Industry, supplying 330,000 people with necessary public service." The shares are offered to local investors direct on the partial payment plan.

Customers Take Preferred Issue.—The entire 50.000 shares of new 7 per cent cumulative preferred stock of the Public Service Corporation of New Jersey offered to stockholders on March 1 at par and accrued dividends has been taken. The offering was oversubscribed 50 per cent. Subscriptions were received from 18,974 customers for 75,179 shares. This is the first of the $25,000,000 of 7 per cent cumulative preferred to be offered. On Dec. 18 last shareholders approved a change in the charter to divide the $50,000 000 authorized preferred stock into two classes, half to remain 8 per cent preferred and half to be 7 per cent preferred. The company now has $18 414,500 in 8 per cent preferred stock outstanding, together with the $5,000.000 of 7 per cent preferred just sold and $30,000,000 in common of $100 par value.

Traffic and Transportation

One-Man Two-Man Cars

The Connecticut Company, New Haven, Conn., has in mind the installation of a lighter type of double-truck car in cases where the present one-man vehicles are carrying an excessive burden. This statement was made by Lucius S. Storrs, president of the company, during a hearing at Hartford recently before the legislative committee on railroads on a bill to abolish one-man cars. He said that the company recognized the fact that there was excessive crowding on these smaller cars at rush hours and it planned to meet the situation by bringing into use a car which could be operated by one man during a part of the day and by a motorman and conductor during the rush periods. This, it is hoped, will solve the problem.

Charges Discrimination in Fare Issue

Piedmont commuters recently protested before the California State Railroad Commission charging discrimination by the San Francisco-Oakland Terminal Railways in the matter of fares.

The investigation of the rates of the Key Route for Piedmont passengers was demanded by the city of Piedmont and the Civic Association, which alleged that the extra 6 cents charged on the Piedmont street cars after the commuter had paid 18 cents ferry and Key Route electric train fare, constituted an unjust discrimination, a disadvantage to the development of Piedmont and a prejudice on the part of the traction company in refusing transfers.

W. R. Alberger, vice-president and general manager of the San Francisco-Oakland Terminal Railways Company, in answer to the argument that transfers were free in Berkeley, testified that the free transfers in Berkeley were made necessary by the competition of the Southern Pacific. The commission will make a decision later.

Woman Secures Business for Railway

Through the quick thinking and good salesmanship of Emma Teague, agent of the Union Traction Company at Pendleton, considerable more shipping business is now being undertaken by the Indiana company. The Hardy Manufacturing Company, which manufactures metal stampings, parts used in automobiles, has shipped its output for years via steam road to Flint and Detroit and practically two weeks' time was consumed in transit. The resulting dissatisfaction caused Mrs. Teague to ask Mr. Hardy, owner of the factory, for a trial shipment. The service given by the electric railway was so pleasing to the purchasing agent for the automobile company that he ordered all future shipments should be sent via the Union Traction. This has resulted in a daily shipment from Pendleton of about 3,000 lb., half of it going to Detroit and half to Flint.

Bus "Feeder" Established by Pacific Electric in Alhambra

The Pacific Electric Railway on Feb. 19 commenced operation of bus service in Alhambra, Calif., a city of 12,000. The bus routes form a loop around the city. Thirty-minute service is operated. The fare charged is 6 cents with transfer privilege between cars and buses within the present 6-cent fare limits of Alhambra. The railway does not operate local lines in Alhambra, but its interurban trains run between Los Angeles and Alhambra and carry passengers within the city limits of Alhambra. Three buses are required to render service over the routes operated, of which one is available for emergency.

With the three new buses in service in Alhambra the Pacific Electric now has three buses in use in San Bernardino, five in Santa Ana, three in Glendale and one at Redlands.

Fares Reduced in Spartanburg

Fares in Spartanburg were reduced on March 12 from 7 cents on some lines and 10 cents on others to 5 cents on all lines by the State Railroad Commission, which is operating the South Carolina Gas & Electric Company.

The commission decided to cut the fare to a nickel as an experiment to see if the plan will work. The commissioners say that the arrangement, like the improved schedules established some weeks ago, is temporary.

State Commission Sanctions Use of Bus by Railway

One of the most sweeping orders ever issued in Massachusetts has been promulgated by the Department of Public Utilities. It authorizes the Eastern Massachusetts Street Railway to acquire, own and operate motor vehicles for the transportation of passengers in seventy-one cities and towns.

This order covers practically the whole territory which this company serves, but it should be explained that the company must also obtain a license from the city or town in which it is to operate. The company does not now intend to run motor buses in all these places, but desires to supplement its railway service with motor vehicle service, feeding into the latter, wherever it can be done to advantage, without competing with some other railway. A measure is in the Legislature on jitney and one-man car operation.

Pacific Electric Plans Completed for Installing Bus Feeder in Pasadena

Plans have been announced for railway and motor bus service in Pasadena, Calif., by the Pacific Electric Railway. The details were agreed upon by the Pasadena Board of City Directors and officials of the railway after six months of negotiations.

The new motor bus "feeder" service will probably go into effect in April. At that time the first buses of the company's order placed on Feb. 16 for eighty-one Model 50 White cars are subject to delivery.

The buses to be operated in Pasadena will run under permits only, no long term franchises being granted by the city. The present bus lines in Pasadena are to be purchased and the equipment removed by the Pacific Electric. Pasadena has a population of 50,000 and the plan announced will give the city a transportation service unsurpassed by any city of its size in the United States, according to the railway directors.

The fare within the city will be 5 cents by purchase of a block of ten tickets, with privilege of transfer. The cash fare will be 6 cents. These fares will become effective at the start of the new bus service. Fares for school children will be reduced to 3 cents by book. The schedules of the buses and street cars will be co-ordinated.

Schedules to be put into effect call for the use of thirty-eight buses in active service, with seven held in reserve for emergency use. The buses have a seating capacity of twenty-five passengers and cost approximately $8,000 each.

The plans call for the continuance of local railway service on some of the most important lines in the city, while in other cases all other local railway service will be withdrawn and motor bus service substituted. None of the railway lines to be discontinued will be abandoned physically until the proposed combination bus and railway service is thoroughly tried out.

The railway now has approximately 40 miles of single track serving as local lines in the city of Pasadena.

Owl service will be given on the buses to all sections of the city.

Scientists to Have Benefit of Buses

The Capital Traction Company, Washington, D. C., began in February of this year the operation of a bus owl service to and from Rock Creek Bridge loop, Twentieth and Calvert Streets to Chevy Chase Circle. The bus owl service will be continued for two or three months until the experiments, in the laboratories of the Carnegie Institution, which are of great importance, have been completed. The change was made from electric owl cars to buses, because the current from the Chevy Chase line, leaking ever so slightly, interfered with the delicate instruments a half mile away.

Protest Launched Against Fare Charge

Resident of the Rainier Valley district, served by the Seattle & Rainier Valley Railway, are indignant because they are still forced to pay 8½ cent fare on the railway lines, while Seattle Municipal riders now pay only 5 cents. As a protest against the higher fare, the residents are endeavoring to organize a system of transporting people to the city by privately owned automobiles, but the railway company threatens to ask immediately for a temporary injunction restraining jitney drivers from operating on streets where the company maintains its lines. In the meantime, the railway officials report a slight dropping off in receipts, and only occasional refusal of patrons to pay the fare charged. The Department of Public Works is conducting an investigation of the investment, expenses and revenues of the Seattle & Rainier Valley Railway, to obtain evidence for a public hearing on the question of transportation rates to be charged by the road. The investigation was ordered following the filing of a petition signed by residents of the Rainier Valley.

While Baby Sleeps Ride the Street Car on Your Unlimited Pass

The weekly pass plan has still another advantage which up to now has not been emphasized. Here's what the editor of a San Diego paper thinks of the pass:

A $1 city line unlimited pass and a smooth riding street car a few days ago accomplished for a little 2-year-old urchin what a fond mother's soothing lullaby failed in the night previous. In the throes of cutting first teeth, the baby had been unable to get sufficient sleep, and the mother was taking young "Bill" down to the dentist in search of relief.

Boarding a car shortly after noon in the arms of his parent, "Bill" calmly took it into his head to enjoy a much needed nap. Delighted over the idea and the excellent judgment of her offspring, the mother, armed with her city line pass, rode back and forth from one end of the line to the other for about three hours, until "Bill" decided to open his sleepy eyes and take notice of the surroundings.

Conductor Buchanan, realizing that any one could ride as long as he desired while holding one of the weekly passes, was puzzled over only one feature of the experience and sent in the following report to headquarters: "How many times should one pass be rung up when a passenger rides all afternoon, boarding car at 12:42 and riding until 3:40? Making three round trips, this lady had a little baby about 2 years old and said as long as it was asleep and her pass good, she would ride until it woke up, and she did. When we would get to the turning point she would turn her seat and be all set for the return trip. The little kid had not slept much the night before, because of trouble with his teeth."

Report Safety Record.—The Spokane & Eastern Railway & Power Company and the Inland Empire Railroad Company, Spokane, Wash., report that they transported 930,000 passengers in 1922 without a single fatal accident.

Fare Hearings Concluded. — The Louisiana Public Service Commission has concluded hearings on the application of the Shreveport (La.) Traction Company for permission to increase fares in Shreveport from 5 cents to 7 cents. The commission has reserved its decision.

Reach Fare Agreement.—As the result of a conference at which were present city officials of Warren, Ohio, County Commissioners and Pennsylvania-Ohio Traction Company representatives the present fare of 10 cents will be continued for three years between Warren and Leavittsburg.

Cheaper Fare Wanted.—A campaign has been started in the Tonawandas looking toward cheaper fares between Buffalo and the twin cities. Although the Public Service Commission some months ago ordered a discontinuance of the zone system and that one fare be charged in the two cities, four different fares at the present time are being charged between Buffalo and points in the Tonawandas.

Pass in Peekskill. — The Peekskill Light & Railroad Company, Peekskill, N. Y., has joined the ranks of the pass-sellers. The company on March 12, put into effect the $1 unlimited transferable weekly pass good in the central zone of the village. Without a pass a ride in this zone costs 10 cents. Another form of weekly pass sells for $1.90, is good in the village limits and also to the neighboring village of Verplanck. The cash fare between the two villages is 20 cents.

Fare Increased.—The El Paso (Tex.) Electric Railway announces that it will increase the fare charged between Juarez and El Paso from 5 cents to 6 cents, effective on March 15. The fare from El Paso to Juarez has been 6 cents for several years, but the fare from Juarez to El Paso has remained 5 cents pending sanction of the increase to 6 cents by the government of the State of Chihuahua, Mex. The government of Chihuahua has now approved the increase.

Hearing Date Announced.—A hearing will be held on March 19 by the Public Utilities Commission of the District of Columbia on the application of the Washington Interurban Railroad to abandon service on Bladensburg Road. The company wants to substitute bus service. The commission stated that the company's request was made as the result of its stated inability to meet certain improvement costs incident to the paving of the roadway.

May Try Flat Ten-Cent Rate.—At a special meeting of the Pittsfield Board of Aldermen on March 2 the members discussed a proposal to join with the Berkshire (Mass.) Street Railway in petitioning the Public Utilities Commission for a ninety days trial of a flat 10-cent fare rate, with transfer privilege, in place of the present 6-cent fare zone system. This followed repeated complaints against the zone system on the part of residents in certain sections. Action was deferred until the next meeting.

Signs to Inform Tourists.—George F. Russell, superintendent of public utilities at Seattle, Wash., announces that during the summer months cars running to the salt and fresh water beaches, to the various parks and other points of interest in the city will bear large signs, descriptive of the various places to which they travel. It is believed that this will not only furnish convenient and desirable information to tourists and strangers in the city, but will also suggest trips which will mean increased revenue for the Municipal Railway.

Rerouting Deferred.—General rerouting of all car lines of Indianapolis along a plan being prepared by officials of the Indianapolis Street Railway and city officials, together with the rehabilitation of the system when the Terre Haute, Indianapolis & Eastern Traction Company installs its new plant, makes it impractical to change more lines at this time, it has been announced. The chairman of the Board of Works in answering a petition for changes divulged the fact that a number of changes in car service and routing will be made later.

Fare Lowered.—The North Carolina Public Service Company, owners of the railway system in Concord, N. C., recently announced a fare reduction in Concord. The new rate is 7 cents instead of the former rate of 10 cents. The electric railway in Concord has been in bad shape financially for some time and the fare reduction is made with the hope that it will increase traffic on the system. This is the opinion of R. J. Hole, vice-president and general manager, who made known the reduction in a letter to City Attorney Caldwell.

Experimental Fare Period Has Expired.—On March 1 the one-year period expired during which a 6-cent fare was authorized by the California State Railroad Commission to apply on the local lines of the Fresno Traction Company. The company is obliged to file with the commission a statement of its earnings and expenses in order to determine the future fare. On a basis of the reports of the commission as to the physical valuation of the railway's holdings, company officials have stated that in all probability the 6-cent fare will obtain for the next twelve months. It is the opinion of city officials, however, that the results portend a return to the former fare of 5 cents, on the basis of the 8 per cent of property valuation allowed the company for profit.

Seeks Higher Fare and Abandonments.—The State Corporation Commission in Richmond was petitioned by the Virginia Railway & Power Company recently for an increase in fares to 7 cents in the city of Norfolk and the abandonment of four lines, the Mason's Creek, Lambert Point, Compostella and Edgewater. The commission heard argument made by the company and the citizens concerning the proposed abandonment and took the case under advisement. In its petition to the commission the company stated that bus competition was directly responsible for the proposed increase and that unless some action was taken by the Norfolk City Council to assist the company "some strenuous means" to avoid disastrous losses would have to be taken.

Personal Items

New Assistant Manager Has Filled Many Positions

H. U. Wallace has been appointed assistant general manager of the Little Rock Railway & Electric Company, Little Rock, Ark. Mr. Wallace is an up-and-doing individual, having worked at various times for utility companies, for Uncle Sam and for himself. He was born in Rock Island, Ill., in 1872. Doubtless many things happened to Mr. Wallace from that time until he was twenty-two years old, but Mr. Wallace, to whom publicity is anathema, has guarded well the secrets of his youth. In 1894 he became identified with the Illinois Central Railroad and until 1905 he served with that company in the above-mentioned role, as superintendent and chief engineer. Private consulting engineering work was his next hobby, which was followed later by his becoming general manager of the Chicago, Lake Shore & South Bend Interurban. He had charge for the receiver of the Fort Dodge & Southern Railway, and among his achievements in this capacity was the supervision of the completion of the electrification of this line, which was part electric and part steam, and also the changing for operation at somewhat higher voltage. At that time this line was doing a combined passenger and freight business.

In 1912 we find Mr. Wallace vice-president and general manager of the Western Light & Power Company, where he remained until February, 1918, when the ambition to do something bigger and better got the upper hand and as a result he entered the Army as Major of Engineers and attached to construction division where he supervised constructing offices in the building of various plants for manufacturing shells, construction of proving plants and the erection of the Edgewood Gas Arsenal. He left the Army April 1, 1919. From that time until his recent appointment he was engaged in private practice.

Appointment Waits on Acts of Legislature

Governor Smith will not appoint a successor to Charles M. Blakeslee of Binghamton, N. Y., Public Service Commissioner, until he finds out what the Legislature will do with bills to be introduced reorganizing the State Public Service Commission. Mr. Blakeslee's term expired at midnight Jan. 31, and under the terms of the public service commission law Commissioner Blakeslee will hold over until his successor is named. There are five members of the present commission. Governor Smith favors a three-headed commission with less power than vested in the present commission. He would give localities control over all public utilities operating within their respective corporate limits. It is expected an agreement will be reached within the next few days as to just how far the Republican majority in the Assembly will go in meeting the program of the Governor on utility legislation.

New Manager of Washington Coast Utilities

R. U. Muffley, formerly superintendent of light and power of the Puget Sound Light & Power Company, Bellingham, Wash., was recently named manager of the Washington Coast Utilities. Headquarters for this corporation, the common stock of which was recently purchased by the Puget Sound Light & Power Company, Seattle, are maintained in the New York block, and from this location the affairs of this concern are managed.



R. U. Muffley

Mr. Muffley was born in Fairmont, Minn., in 1883. He was educated in the public schools of Fairmont and was graduated from Tolands Business College at La Crosse, Wis. After finishing school, he returned to Fairmont, where he was employed for four years as fireman in the plant of the Fairmont Electric Light Company.

He migrated West in 1903, stopping en route to the coast at Spokane. In the latter part of 1903 he entered the employ of the Globe Electric Company in Seattle, engaging in miscellaneous construction operations.

Early in 1904 he removed to Bellingham and became affiliated with the organization of the Whatcom County Railway & Light Company, first as a motor repairman and wireman. In 1906 he was promoted to foreman of inside construction and motor repairs. During this year, the Whatcom County Railway & Light Company absorbed the electric properties of the Bellingham Bay Improvement Company, these properties including a power plant at Nooksack Falls under construction. In 1908 Mr. Muffley was named superintendent of distribution, succeeding W. S. Quimby, and in 1911 was again promoted, this time to superintendent of light and power, in charge of all light and power plants, electric railway lines and a gas plant owned by the corporation. This position he held until his promotion and transfer to his present post, that of manager of the Washington Coast Utilities.

The holdings of the Washington Coast Utilities include the properties in the following places operating these services: Wenatchee, gas, light and power; Arlington, light, power and water; Vashon, light, power and telephone system; Port Townsend, light, power, gas and an ice plant; Elma, light and water; South Bend, water; Tenino, water; Edmonds and Richmond Beach, light and water.

The gross revenues of the Washington Coast Utilities are about $700,000 a year.

Major-General O'Ryan Will Investigate Veterans' Bureau

Mars may or may not be at perihelion, but O'Ryan is always in the public eye. As if it were not enough to be constantly under fire as a member of the New York Transit Commission Major-General John F. O'Ryan has been retained as counsel by the special Senate committee which will investigate affairs of the Veterans' Bureau. The Senate committee will meet during the summer and General O'Ryan expects to be able to carry on his part of the job without interrupting his work with the commission.

Because this member of the Transit Commission is in the midst of Mayor Hylan's steely shots of "Home Rule" and "A 5-Cent Fare" and equally steely protests from an indignant 8:30 a.m. commuter he does not lose his perspective. Einstein's theory of relativity he seems to have mastered as it relates to this particular problem of an infinitesimal section of the cosmos. For Major General O'Ryan realizes that he cannot push out the traction companies and overnight sweep the city clean of troubles.

While sitting through weeks and weeks of testimony, while plotting ways to relieve the congestion instantly, keep a 5-cent fare forever and ever, provide a seat for every passenger, abolish straps and straphangers by miraculous power, Major General O'Ryan has kept his head, when all about have been losing theirs and somewhat blaming it on him.

In the New York *Times* a short time ago the Major explained this plan over which he has spent so much time since early in 1921. To the general public that explanation must have been like the flash of the revolving light from the tower of a lighthouse, for it proves in unmistakable terms that there is stability and solid foundation amidst what to most people must up to the present time been utter blackness. There have been, of course a few all

along who have understood, just as the ship's captain who has his charts to guide him knows all about the lighthouse without seeing the red flash, but it is to the crying multitude that this flash of clarity in the whole doings gives assurance.

One might never guess that this member of the Transit Commission, with the title of Major-General, is a lawyer by profession. That is, one would never guess it unless he had attended the hearings of the commission and heard the office-lawyer interject into the proceedings clear, logical questions and remarks which have the quality of leadership belonging to the military part of him. He commanded a division in the A. E. F., and was the only militia officer thus honored.

Employee Re-elected to Louisville Railway Board

The policy adopted last year of election of one director to the board of the Louisville (Ky.) Railway by his fellow employees has proved very helpful to all concerned. D. L. Kehl, way department representative on the general committee, who has acted as a director of the company during the past year, was, at an election held on Feb. 14, 1923, re-elected to that position by a majority of the votes cast, 89 per cent of those in the Co-operative Welfare Association voting in this election.

John S. Bleecker, general manager of the Indiana, Columbus & Eastern Traction Company, was recently called from Springfield, Ohio, to Nashville to be at the bedside of his dying wife. Mrs. Bleecker succumbed on March 8.

A. H. Favreau has replaced George W. Cook as superintendent of the Southern Illinois Railway & Power Company, Harrisburg, Ill. The position of general superintendent has been given to Fred L. Shimer and general agent to M. H. Wetlaw.

Percival Chrystie has been elected president of the Taylor-Wharton Iron & Steel Company, High Bridge, N. J., to succeed the late Knox Taylor. Mr. Chrystie was formerly vice-president and has been acting president since Mr. Taylor's death. He progressed through the various departments of the company during his thirty or more years of service, acting as superintendent of the steel foundry, then secretary and treasurer and finally vice-president, a position he held for many years.

J. F. Uffert, who as superintendent of equipment of the New York State Railways, Rochester, N. Y., was called upon in the emergency to supervise the restoration of the equipment of the Schenectady Railway when the collapse of the latter's rolling stock came in January, has been made superintendent of equipment on the Schenectady lines. Mr. Uffert retains his position with the New York State Railways in Utica, Syracuse and Rochester. He is also holding a similar position with the New York & Harlem Railroad, New York City.

Mr. Buck on the Journal Staff

Morris Buck has resigned his connection with John A. Beeler, consulting engineer of New York, to become associate editor of ELECTRIC RAILWAY JOURNAL, with headquarters in New York. For the past seven years he has been Mr. Beeler's principal associate in the extensive consulting work in which the Beeler organization has engaged in the electric railway field. He has had charge of important investigations on many surface, rapid transit and interurban railways throughout the country, including the studies made for such systems as those in Boston, eastern Massachusetts, New York, Philadelphia, Washington, Newark, Chicago, Kansas City, Richmond, New Orleans and other places. This work has been of a varied character, including a wide range of operating and valuation problems, and with railways, municipalities and commissions as clients. Mr. Buck thus brings to the JOURNAL staff a mind



Morris Buck

trained in investigation and analysis work, a background of practical observation, and a round of experience before public bodies that should be invaluable as reflected in the columns of the JOURNAL for the benefit of the industry as a whole.

While Mr. Buck's consulting experience is of greatest interest, his earlier education and experience have been of a character to round out his knowledge and peculiarly fit him for the work now at hand. His early education was in the public schools of Washington, D. C. He received the degree of mechanical engineer from Cornell University in 1904, and the degree of electrical engineer from the University of Illinois in 1917. He served as a machinist's helper and special apprentice on the Delaware, Lackawanna & Western Railroad during his course at Cornell. Upon graduation he went into the employ of the Westinghouse Electric & Manufacturing Company as a designing engineer and then in 1905 took a position as instructor in electrical engineering at Cornell University. During 1906 he acted as engineer for the Mechanical Appliance Company and then returned to the Westinghouse Electric & Manufacturing Company for a year. He was employed as cost analyst by the Mellon National Bank, Pittsburgh, during 1908, and for two years following was assistant professor of electrical engineering at New Hampshire State College. During the next year he served as professor of electrical engineering at Clarkson College of Technology, and following this went to the University of Illinois as assistant professor in charge of the electric railway courses. During his six years at the University of Illinois he became very well known in the electric railway field for the work done in analyzing railway engineering problems graphically and the development of test equipment.

Mr. Buck is the author of "The Electric Railway," a standard text book in general use. He is a Member of the American Institute of Electrical Engineers, Fellow of the American Association for the Advancement of Science, and holds membership also in the American Electric Railway Association and the Society for Promotion of Engineering Education. Mr. Buck was born in Washington, D. C., in 1881.

John Brandon was recently elected secretary of the Alabama Public Service Commission. He succeeds Hugh White, appointed special attorney. Mr. Brandon for a number of years was secretary of the Alabama pension commission.

Obituary

George H. Hunter

George H. Hunter, superintendent of the Holyoke (Mass.) Street Railway, is dead. Mr. Hunter had been ill for some time. He entered the employ of the company on Aug. 4, 1884. At that time he was engaged in sawing timbers and preparing ties for the construction of the first section of the local railway at Holyoke. Before that he was employed by the Merrick Thread Company. After the local line at Holyoke was completed Mr. Hunter alternated in the service by driving a horse car in winter and acting as foreman of the track repair gang in summer. It was not long, however, before the road was equipped for operation by electricity. With the change in motive power he was made superintendent. Mr. Hunter was born in Quebec sixty-four years ago. He had resided in Holyoke forty-five years. He was extremely popular with the rank and file of the men employed by the company. Mr. Hunter is survived by his wife.

William H. McChell, Commissioner of Public Safety for the City of Guthrie, Okla., for the last eight years, died at his home in Guthrie recently after an attack of neuralgia of the heart. Mr. McChell was sixty years old. He had been interested in traction affairs for a number of years and was one of the best-known city officials in the state.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

To Consider European Trade

Practical Problems of Foreign Sales Management to Be Discussed at Foreign Trade Convention

The preliminary program of the Tenth National Foreign Trade Convention, New Orleans, May 2-3-4, has been announced by O. K. Davis, secretary of the National Foreign Trade Council. Mr. Davis said that the convention will center around the theme "European Conditions as Relating to World Trade."

HALF OUR EXPORTS TO EUROPE

This subject is regarded by all odds the overshadowing factor in our foreign trade and domestic prosperity today. In spite of all that has been said on this subject, Mr. Davis says there does not yet seem to be a clear understanding of the part which Europe plays in our daily life. More than half our exports are sent to Europe; more than one-third of our imports come from Europe. Under such conditions it is not too much to say that every man, woman and child in the United States is vitally interested in the present developments in the countries of Europe.

GERMANY A BIG BUYER

Mr. Davis says the situation with regard to Germany is particularly important. Germany consumes more American products than any other country, except the United Kingdom and Canada. These exports to Germany are largely foodstuffs and crude materials, in the production of which American farmers are particularly concerned. The cotton planters of the South, the grain-growers of the Middle West, the cattlemen of the Southwest, and the copper miners of the Northwest, says Mr. Davis, all have a real personal stake in our trade with Germany.

The full outline of the program follows:

WEDNESDAY, MAY 2

First General Session: Report on European Conditions Today; European Progress During the Last Year; Trade Barriers; Trading in the Face of Depressed Exchange.

Group Sessions: "Education for Foreign Trade"; "Banking Facilities for Foreign Trade"; "Export Managers" (in co-operation with the Export Managers Club of New York).

THURSDAY, MAY 3

Second General Session: The Farmers' Stake in Foreign Trade; The Selling Value of Imports; Need for Foreign Trade Zones; Foreign Trade Facilities of the Federal Reserve System.

Group Sessions: "Expanding Exports" (in co-operation with the American Manufacturers Export Association); "Trading in Latin America"; "Export Merchant."

Trade Adviser Service:

FRIDAY, MAY 4

Third-General Session: Inland Water Transportation as Affecting the Farm and the Railway; Railway Service for Foreign Trade; The Shipping Situation of the World.

Group Sessions: "Pacific Coast Problems" (in co-operation with the Pacific Foreign Trade Council); "Foreign Credits" (in co-operation with the National Association of Credit Men); "Export Advertising."

Banquet:

SATURDAY, MAY 5

Inspection of Port, Industrial Canal and Inner Harbor.

Copper Costs More

Supply of Refined Metal Reduced to Less Than Six Weeks' Supply—Buyers Bidding Material Up

Copper may not be king just now, but it is apparently headed that way. For months the market for the red metal was in the doldrums while the surplus production was being worked off that had accumulated during the war-time period. With the return of business activity the stocks of the metal on hand have been reduced and the price is climbing. At first the quotation changes were hardly perceptible separated as they were by long intervals, but recent weeks have seen the price advanced until on March 15 it was 17 to 17⅛ cents.

COSTS REFLECTED IN MANUFACTURED ARTICLES

This advance will of course be reflected in the cost of the manufactured articles into which copper enters, and as such articles are innumerable in electric railway work it means another addition to the cost of doing business. Statistics of the trade show many manufacturers stocked up well ahead with metal accumulated at or near the low price, but despite this the price quotations for some of the manufactured articles almost immediately reflected the increase in the price of the raw material. In the case of copper wire, to mention just one article, the advance in price has been close to 6 per cent since the first of the year.

Everybody who has thought about the matter knew that a condition could not exist indefinitely where the cost of producing and mining the raw product exceeded in many cases the selling price of the metal itself. Those who were foresighted and at the same time forearmed with funds anticipated their immediate demands. Over them there is no immediate need for concern. The question more properly is, What of the future?

Predictions as to future prices in any line are always precarious, for the variable factors that enter into consideration make it impossible to look very far ahead. If this were not true then given any set of conditions, the matter of prediction could be reduced to a formula. As for buying it is nearly always very largely on an upward scale. So it has been with copper. No sooner had the price advance begun than the purchase demand increased. Buyers are bidding against each other. Despite this the quotation for the metal has remained fairly firm near present levels for some days now. This is not taken to mean that the upward trend of the market has run its course, but rather that quotations are marking time in advance of another upward march.

As one authority sees it some of the principal factors that have contributed to the present price movement of copper are:

1. Reduction in refined surplus from 747,000,000 pounds to 268,000,000, or less than six weeks' supply.
2. Exports almost 75 per cent of pre-war takings despite present chaotic political conditions in Europe.
3. Relatively low price level for copper in comparison with other basic commodities.
4. Great expansion in the avenues of copper consumption.
5. High rate of consumption for all commodities essential in construction.
6. Inability greatly to increase copper output due to shortage of mining labor.
7. No new sources of copper supply developing.
8. Elimination of cheaply produced South American metal as menace to price.

There is no need to recite the various uses to which copper is put in the electric railway industry. A long list of such uses will suggest itself at once to everybody engaged in the industry. There are no really accurate figures of the consumption of copper in the electric railway field, but a survey made some time ago by the ELECTRIC RAILWAY JOURNAL indicates that for wire alone more than 12,000,000 pounds are used annually, this amount including the consumption for such items as trolley wire, transmission wire, trolley wheels, rail bonds, etc. The consumption of trolley wheels has been placed at 500,000 annually.

On the basis of this consumption figure the added cost to the electric railways for a 1-cent increase in the cost of copper would appear to be infinitesimal, but it must be remembered that the increase in the quoted price is several cents over the figure of a few weeks ago and that every increase in the price of raw material is reflected in an advance proportionately much larger in the price of the manufactured article into which the use of copper enters.

Metal, Coal and Material Prices

Metals—New York	March 13, 1923
Copper, electrolytic, cents per lb.	16.875
Copper wire base, cents per lb.	19.125
Lead, cents per lb.	8.25
Zinc, cents per lb.	8.025
Tin, Straits, cents per lb.	51.25
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	$7.00
Somerset mine run, Boston, net tons	3.625
Pittsburgh mine run, Pittsburgh, net tons.	2.55
Franklin, Ill., screenings, Chicago, net tons	2.375
Central, Ill., screenings, Chicago, net tons.	1.45
Kansas screenings, Kansas City, net tons..	2.625
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	7.50
Weatherproof wire base, N.Y., cents per lb.	19.50
Cement, Chicago net prices, without bags.	$2.20
Linseed oil (5-bbl. lots), N.Y., cents per gal..	1.01
White lead, (100-lb. keg), N.Y., cents per lb.	13.375
Turpentine (bbl. lots), N. Y., per gal.	$1.53

Coal Commission Speeds Its Work

With the removal of uncertainty with regard to its appropriation, and in fact its very existence, the President's Coal Commission is bustling with increased activity. The statistical force has been expanded and the tabulation of the information contained on the questionnaires has been speeded up decidedly. During the week ended March 10 a material increase in the rate of tabulation was achieved. The returns also are being received in greater numbers.

New questionnaires now are being prepared to cover certain phases of distribution. The American Wholesale Coal Association and the Retail Coal Merchants' Association are being consulted in connection with the preparation of these schedules. The field investigations in connection with wholesale and retail practices in the larger cities are now being completed.

Federal Distributor Wadleigh reported on March 11 that there has been some improvement in the fuel situation in New England and northern New York. Largely due to motive power trouble, there still is room for great improvement in the railway service. Difficulties continue in New England harbors and a number of applications for service orders intended to give priority to the discharge of coal cargoes have been filed. Mr. Wadleigh stated that it is the present plan to issue another stock report on April 1 and still another on June 1.

Finance Committee Approves Municipal Railway Car Plan

The finance committee of the City Council of Seattle, Wash., by unanimous vote has recommended passage of an ordinance authorizing the Board of Public Works to call for bids for 100 new lightweight, modern type cars, with seating capacity for fifty-eight passengers each, and equipped with the latest appliances, including electric heaters. It is proposed to lease the cars with an option. It is confidently expected that the Council will approve the plan. If it does the Board of Public Works will immediately issue a call for bids. Finance Chairman E. L. Blaine said he felt certain the call would bring offers, unless the car building companies are so rushed with business that the proposition might not be attractive at this time. The new cars will be used to replace ninety-one cars of the 600-type now in use. It is proposed to have seventy-five cars of the 500-class remodeled in the department's shops.

Rolling Stock

St. Petersburg, Fla.—Bids will be open this week by the city on the new cars to be purchased for the Municipal Railway, at an estimated cost of $30,000.

Brooklyn (N. Y.) City Railroad has placed an order for fifty-four pair of Brill type 62-E 1 trucks for use in motorizing fifty-four trailers, as reported in last week's issue of the JOURNAL.

Groton & Stonington Traction Company, Norwich, Conn., has purchased two Fageol buses of the street railway type or city type. The company has also purchased one of the Model 50 White buses which is now in use on the branch line between Mystic and Old Mystic.

Johnstown (Pa.) Traction Company has received four double-truck cars, purchased from the Cleveland Railway. They will replace single-truck cars. Eleven more cars are to be received within the next few months. The cars will be repainted and re-equipped and placed in immediate service.

Pennsylvania Railroad, New York, N. Y., has ordered new equipment to be placed in service this year which involves an expenditure of more than $57,000,000. The orders include three electric locomotives and fifteen suburban type steel passenger cars equipped with electric apparatus for electric suburban service.

Track and Roadway

Union Traction Company, Coffeyville, Kan., is planning to extend its electric line into Oklahoma, and will have the terminus near Oolgah, Okla., where the company has recently acquired leases on a large block of coal land. The company will open several mines and develop the leases, and it is expected that considerable tonnage for the electric line will thus be provided.

New Haven, Conn.—The Southern Connecticut Electric Company is seeking a charter to operate over the abandoned stretch of the old Shore Line east of New Haven. William A. Sperry, interested in the incorporation of this company, recently purchased the part of the Shore Line Electric Railway between New Haven and Saybrook, which had not been in operation for several years.

Springfield (Mass.) Street Railway has petitioned the city of Springfield for a double-track location through Vernon Street and in a loop through Broadway, Pynchon Street and Water Street to the Hampden County Memorial Bridge. This is proposed to be a terminal for lines coming into the city over the new bridge and also for certain other lines, and if approved the loop will supersede the present loop around Court Square.

Youngstown (Ohio) Municipal Railway expects to rebuild its lines on Albert Street. This is the next improvement in the company's program stated by Superintendent Stewart at the recent meeting of the Council street railway committee with Commissioner Engle. The work will cost about $46,000, of which about half will be charged to maintenance expenses and half to the company's capital value under the provisions of the franchise.

Trade Notes

J. G. Brill Company, Philadelphia, Pa., has delivered all the gasoline-driven cars to the Pennsylvania Railroad which the company ordered last year.

Pure Carbon Company, Wellsville, N. Y., announces the recent establishment of a northern West Virginia representative, Norman Strugnell, Clarksburg, W. Va. Mr. Strugnell is qualified to give personal engineering service on all brush problems and requirements in this territory.

Harry Marlin, European representative of the Railway Supply & Manufacturing Company, Cincinnati, Ohio, and Arthur Joseph and F. A. Hamilton, vice-president and secretary respectively of the concern, sailed for Europe on the "Majestic," March 10. Mr. Marlin recently returned from Dresden, after spending a year there. He is returning to that city for a stay of another year or two. Messrs. Joseph and Hamilton will remain abroad about six or seven weeks, visiting the company's foreign business associates with Mr. Marlin.

Standard Underground Cable Company will, on April 1, move its general offices and Pittsburgh sales office from the Westinghouse Building to the company's new factory and office building at 100-108 Seventeenth Street. The Standard Underground Cable Company also announces the opening of a branch of its St. Louis sales office in the Scarritt Arcade Building, 817-819 Walnut Street, Kansas City, Mo. E. H. Shutt will be in charge of the new office as district sales agent. Mr. Shutt has been connected with the company for several years.

New Advertising Literature

Graver Corporation, East Chicago, Ind., has issued bulletin No. 509, which describes the Graver zeolite water-softening equipment.

Pittsburgh (Pa.) Testing Laboratory has issued bulletin No. 28, which shows the service its inspecting engineers and chemists are prepared to render on electric railway equipment.

Railway Improvement Company, New York, N. Y., has issued an illustrated booklet on the Ransom vacuum oiler. It shows the oiler installed on motors on a large number of properties.

J. G. Brill Company, Philadelphia, Pa., will publish the Brill magazine quarterly beginning with April of this year. The magazine is distributed gratis to individuals affiliated with the electric railway industry.

General Electric Company, Schenectady, N. Y., has issued bulletin No. 46,053, describing with illustrations the portable timing device. This device consists of an increased clock, to be used with a standardized clock, as a means of secondary timing, to supplant the stop watch.

Peacock speaks of—
the income tax problem!



PEACOCK BRAKES

Eliminate another big tax on income

NOW that income tax returns are uppermost in your mind, consider the drain that accidents annually make on your company's income. Are they a necessary evil? Have you really utilized every possible means to equip yourself against their occurrence?

Peacock Brakes, powerful and reliable, are the most inexpensive protection against one type of accident, that you can possibly secure. It is the reliability factor which makes Peacock Brakes the most dependable equipment for electric railway cars, whether used as the regular service brake, or merely for emergency conditions.

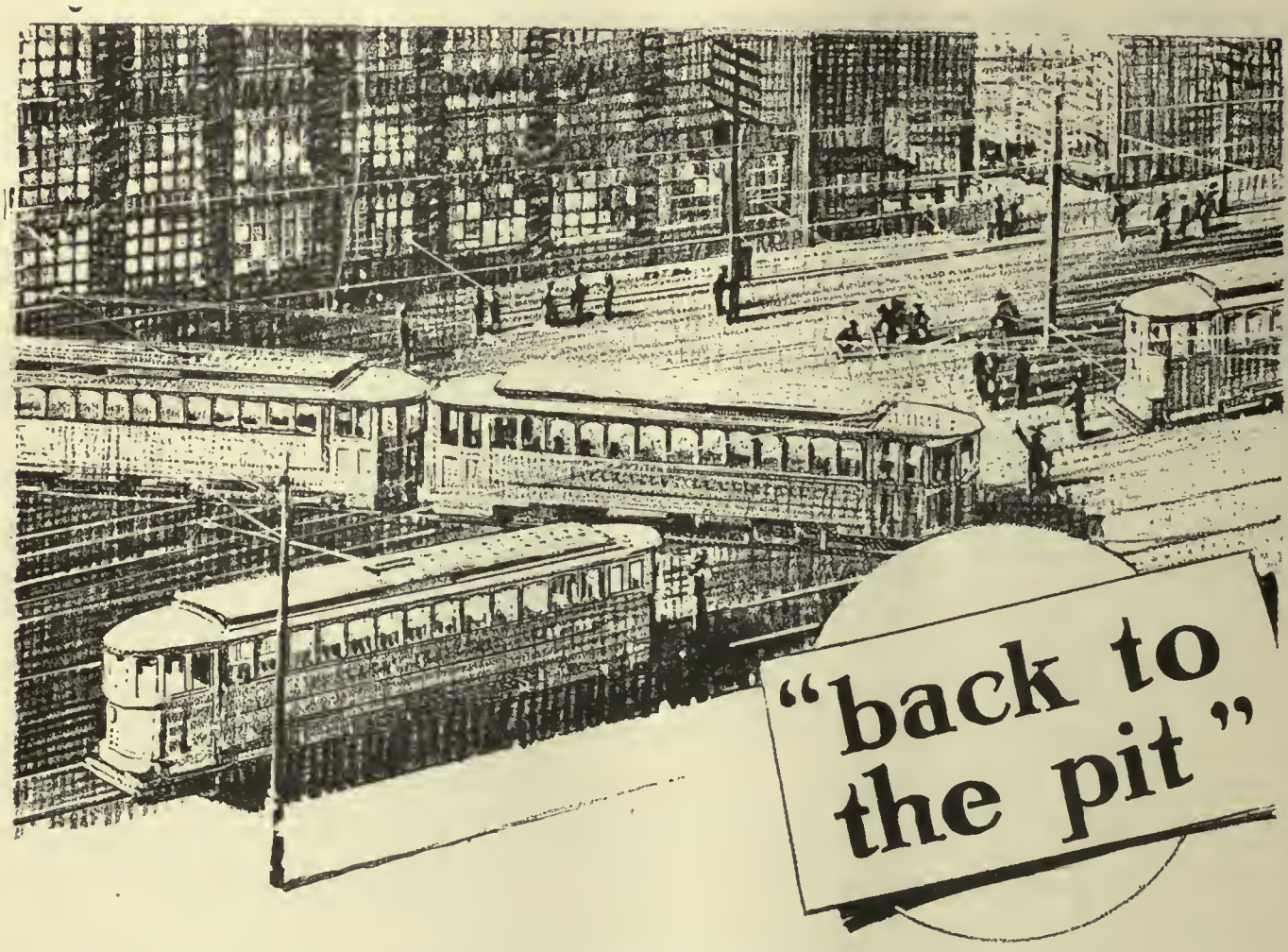


Peacock Improved Brake

NATIONAL BRAKE COMPANY, Inc.

890 Ellicott Sq., Buffalo, N. Y.

Canadian Representative:
Lyman Tube & Supply Company, Limited, Montreal, Canada



One way to prevent Car Failures

WHEN A CAR is turned back on the run, the apparent cause may be a burned-out armature bearing, a hot journal, or trouble with a brake or door engine.

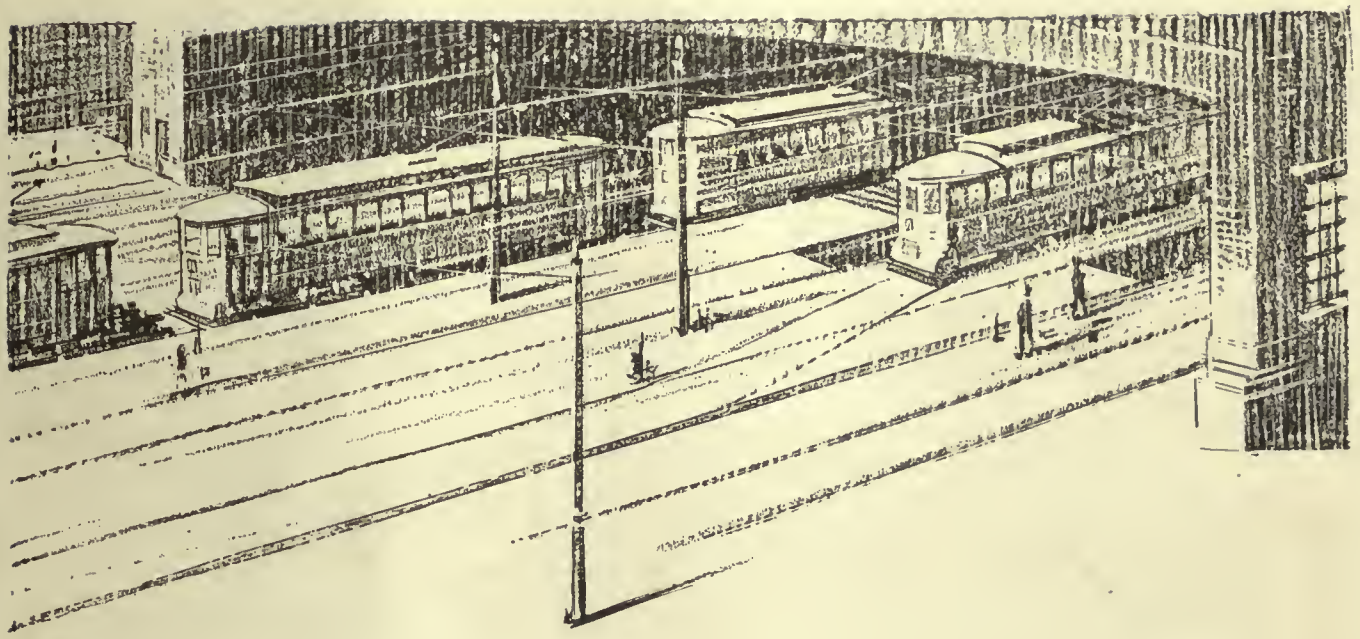
When we look deeper for the *fundamental cause,* we usually find it to be faulty lubrication.

We have seen street railway systems all but wrecked because someone in authority proclaimed—"Oils are all alike, let's buy the cheapest."

We speak from years of experience in effecting operating economies on street railways throughout the world when we say this:

The amount you can save on

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so-called "cheap" oils over the best oils you can buy is of course something—

But, the difference in results makes the slight price differential seem microscopic.

With us the lubrication of street railways has been a subject of highly specialized study. Our Engineers are at your service.

If you have not already done so, it will pay you to talk with a Vacuum Oil Company representative. A line to our nearest branch office will put you in touch with him.

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Lubricating Oils

A grade for each type of service

Domestic Branches:

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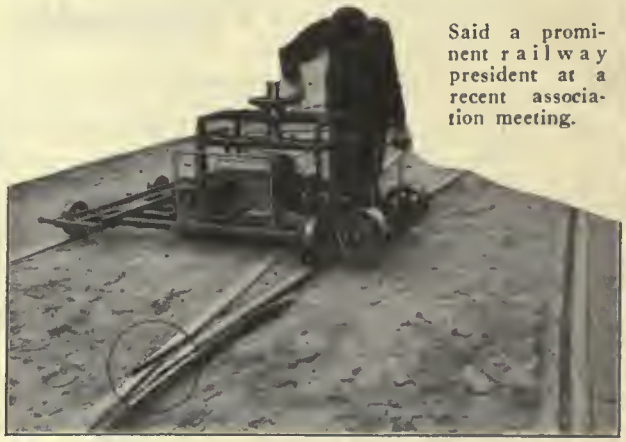
ELECTRIC RAILWAY JOURNAL

Every Week

THE P. EDWARD WISH SERVICE
50 Church St. NEW YORK — *Street Railway Inspection* DETECTIVES — 131 State St. BOSTON

When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.

"Fix up the track first"—



Said a prominent railway president at a recent association meeting.

"The place where we need to take hold most vigorously at the present time is in track habilitation—our run-down track is increasing our operating expenses"—words which many a roadmaster will echo.

SEYMOUR MIDGET RAIL GRINDERS
for economical maintenance.

Rail grinding is now firmly established as one of the real constructive maintenance economies. *Seymour Rail Grinders,* used on numerous well-known roads, are proving their unique value as efficient machines for this work. Light, fast and above all, inexpensive.

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Paving Breakers used to break out concrete ahead of track reconstruction crew.

More maintenance work

Pneumatic Tie Tampers reduce track crew

Six men cutting, paving and tamping ties as shown in the illustrations are giving the equivalent of about twelve men's work with hand tools. Over seventy prominent traction companies are now using Ingersoll-Rand Tampers and Paving Breakers as standard equipment in their track departments because they practically cut the labor bill in half. Furthermore, when tamped with all the power and persistence of pneumatically-operated equipment, the ballast is more firmly and thoroughly packed under and around the ties, giving a better and more permanent construction.

Write for bulletins and complete information

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This railway company organizes a four-man tie-tamping team with Tie Tampers.

with lower labor cost

Ingersoll-Rand Equipment has many uses

The use of pneumatic tools and equipment is not limited to the track department. Ingersoll-Rand Riveting and Chipping Hammers are efficient and economical aids to bridge and structural crews. Ingersoll-Rand Compressor Outfits are used by many of the largest electric railway companies for operating paint spray outfits, sand blast equipment and other pneumatic tools. I-R Portable Compressors, for either gasoline or electric drive, are built in various sizes to meet any railway requirements, mounted on smooth-tread, or flanged wheels as desired.

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An 18-in. diameter "GENUINE OPEN HEARTH IRON" Culvert Pipe installed under the right-of-way of the C. N. & C. Street Railway Co. at Sunnyside Stop on the Cincinnati-Fort Thomas Line.

Ask any Electric Railway user!

Inquire whether or not Newport Culverts LAST and stay PUT. They'll tell you, with a grin of satisfaction (like the gentleman in the picture) that it PAYS to get these culverts. Because—they're made of "Genuine Open Hearth Iron," 99.875% Pure Iron—Copper Alloy, coated with 2 ounces of spelter per square foot, for added protection! NEWPORT CULVERTS mean right culvert service on the right of way!

THE NEWPORT CULVERT CO

GENUINE OPEN HEARTH IRON

INC.

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Giving New Track Long Life and Old Track New Life

The welding of rail joints in paved construction with the RWB Carbon Arc Process brings track maintenance costs down to a minimum. With these sturdy joints on new rail, the track is prepared for many years of continuous service as the joint plates are solidly welded to the rails.

In the same manner, many electric railways have reclaimed miles of old track. By so doing, additional years of good service were secured at low cost.

The RWB Carbon Arc Process of welding is a specially developed method of welding rail joints. Through mechanical means the welding is done in a simple and quick manner. The equipment is so compact that work can be done without interruption to traffic. The proper welding current is supplied by the well known type WW Dynamotor, which is a portable unit. All of these features add to the convenience and low cost of installing RWB Joints.

Type WW Dynamotors are also used for building up cupped rails, repairing manganese special work and shop welding with both metallic and carbon arc. With its large capacity two operators can use it for metallic welding. These important ways of utilizing the type WW Dynamotor make it a machine which is capable of producing large savings for both track and shop.

Send for a catalogue now.

Rail Welding and Bonding Company

Cleveland, Ohio

FERALITE—Latest development



The Start:— Rail ends are butted and lined up, then an opening is cut through the base and web, up to the rail head, using the oxy-acetylene torch.



The Process:— The molds are adjusted and clamped, the rail is heated to welding temperature, the aluminothermic reaction is carried out, and the superheated steel is tapped into the mold.



Finished Weld:— The result is a solidly fused pair of rails, as strong mechanically and as continuous electrically as any part of the original rail.

The advantages of this kind of weld over the ordinary rail joint, are almost too well known to need enumeration. It lasts as long as the rail, does not cup, requires no maintenance and eliminates the expense of rail bonds. Of more interest to the well-informed railway man, is the fact that the **FERALITE Process** puts this type of weld on a practical basis—uniform, efficient and economical.

ALUMINO-THERMIC FERALITE TRADE MARK WELDING MIXTURE

ALUMINO-THERMIC

Roselle Park

in aluminothermic welding process

Correct theory backed by practical experience

To meet the insistent demand of electric railway engineers for a uniform product and an economical process, as applied to aluminothermic welding of rail joints, this Company was formed to develop and market the FERALITE Process. We secured as Consulting Engineer, the famous Professor Hans Goldschmidt, known the World over as inventor of the aluminothermic reaction for welding iron and steel.

This Company is composed of men of long experience in the railway and the welding fields. Our engineers, in both the manufacturing and the service departments are thoroughly familiar with the requirements peculiar to electric railway operation, and the importance of local conditions in every individual case. In developing the FERALITE Process, and in applying it to railway work, our primary purpose, always in view, has been to make it a *practical process,* that is, a process which would give not only the most satisfactory results from a maintenance standpoint, but one also which could be applied at a cost within the range of reasonable economy.

FEATURES of FERALITE

Foremost among the many purely mechanical advantages of the FERALITE Process, is the fact that nothing intervenes between the original rail heads. They are butted together and welded solid. This permits an absolutely correct alignment to be made, and eliminates the lack of uniformity which may occur if any other metal is introduced between the original rail heads. When welding old rails, it is not necessary to cut out any part of the rail head —the FERALITE Process cares for them as they are.

Uniformity of the mixture is insured when you use FERALITE. It is manufactured and mixed in our plant, under constant personal supervision of an expert in this process. Because of the use of nothing but highest grade pure materials, accurately portioned as to chemical contents and suitably mixed, FERALITE steel is free from impurities, blow holes, and hard spots, when poured into properly-prepared molds.

By means of the FERALITE Process, which butts the rail ends, there is little or no excess metal to be ground.

Crucibles and apparatus which we furnish are light in weight, but amply strong. Our special rail crucible holder, shown in the illustration, is designed to permit quickest adjustment and centering.

When it comes to *costs,* we are prepared to show you that there is a possibility of real economy in aluminothermic welding. Our equipment is inexpensive, but practical and rugged, and you will find our scale of prices on FERALITE portions, most attractive.

The information you want

will be sent by return mail. Our experts will gladly advise you of the other advantages, the applications, and the cost of FERALITE welding. When asking for quotations, tell us the rail section you are using, and the number of joints to be welded.

Write for Booklet B.

CORPORATION

New Jersey

ALUMINO-THERMIC FERALITE TRADE MARK WELDING MIXTURE

Proven Improvements Available for

How MANY of these economy and betterment measures can you check off ☑ as done? How many can you check off ☒ as thoroughly considered and found not applicable to your conditions? How may blank squares remain to indicate backwardness or to show where your studies should be directed in 1923, if you are to keep pace with progress?

☐ Have you inaugurated a system for the periodic checking of traffic and the re-scheduling of cars on all lines, so that service will follow changing traffic, avoiding wasteful car-miles but providing all the transportation that will be bought?

☐ Have your cars been rerouted to better serve traffic as material changes in courses of travel have taken place?

☐ Have you discarded the ponderous one-man cars and substituted the use of light-weight one-man cars in light interurban service?

☐ Are you making full use of one-man safety cars in city service?

☐ Have you entered upon a program of revision of the better existing cars for operation with one man on the interurban and suburban lines and the lighter city lines, utilizing safety devices to improve safeness of such operation and its psychological effect on the public?

☐ Have you substituted modern for ancient motors, saving weight and energy consumption, maintenance expense and road delays?

☐ Are you using a modern fare collection system with approved fare box and a modern conductor's register, including through service with other lines?

☐ Have you looked into the possibilities of hauling livestock?

☐ Are you using modern turbine equipment in your power plants, or are you retaining obsolete prime movers, reciprocating engines, or early type turbines, dissipating profits in wasted heat units?

☐ Have you modernized your generating plant by the installation of economical auxiliary equipment, metering devices and automatic control and test equipment?

☐ Have you begun the installation of automatic substation control to reduce labor charges, save energy and free the system from possibility of shutdown on strike of a handful of men?

☐ Have you given your line materials the same careful attention that you have rolling stock, track and power system? Many improvements in line materials and construction have been made which increase the life of the overhead and decrease the work and number of trouble crews.

☐ Are you utilizing modern steel poles in the cities for economy, permanence and appearance?

☐ Have you substituted machines for hand work and saved labor costs to the great extent that they have been proved to reduce maintenance charges on both track and cars?

Can you check this important item?

Beckwith-Chandler Car Finishes sell

Bettering Operation

☐ Are you utilizing substitute ties where they would decrease the first cost and possibly extend the life of new and rebuilt track in paved streets?

☐ Are you using electric welding in connection with trackwork maintenance, but not carrying the welding to the point that it is more expensive than replacements?

☐ Are you employing the latest developments in rail joints?

☐ Have you substituted modern machine tools for obsolete tools, and improved methods in the shop department.

☐ Are you conserving the time of shop labor, of track storage yard labor, and the storeroom help by use of proper material handling equipment?

☐ Are you using an energy-saving device to reduce power bills, maintenance bills, and improve the general handling of cars?

☐ Are you [illegible] in energy possible [illegible] thermostatic control of [illegible]s?

☐ [illegible] possible [illegible] inspection of cars on a kilowatt-hour basis, particularly as against a periodic inspection, but also in comparison with inspection on a mileage basis?

☐ Are you utilizing the practice of dipping and baking armatures and field coils to reduce the number of electrical failures?

☐ Have you adopted spray painting, together with a fixed schedule for keeping cars brightly painted for the sales value therein?

☐ [illegible] reclamation of

Transportation

shop to reclaim worn or broken parts?

☐ Are you using closed vestibules to reduce accident expenditures?

☐ Are you using automatic door engines to shorten the standing time?

☐ Have you installed automatic electric switches to facilitate the movement of cars and eliminate the delays that aggravate passengers?

☐ Are you employing train operation to handle rush-hour traffic or all-day traffic on extremely heavy lines, using motor and trailer or multiple-unit cars?

☐ Are you using automatic couplers to save time at the terminals, to reduce maintenance costs on inter-car connections and reduce hazard to trainmen?

☐ Are you using automatic slack adjusters [illegible] and brak[illegible]

Recognition

Observe how authorities now-a-days are including bright fresh paint and varnish among the prime requisites for attracting and pleasing patrons. This is from the *Electric Railway Journal*, (Jan. 6, 1923).

Here are a few of the many well-known companies both steam and electric, which use—

Beckwith-Chandler
Paints and Varnishes

Philadelphia Rapid Transit Co.
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San Francisco Municipal
Chicago Surface Lines
Metropolitan West Side Elevated Ry. Co.
The Pullman Company
Pennsylvania Railroad Co.
New York Central R. R. Co.
Chicago, Burlington & Quincy R. R. Co.
and many others

Write our railway service department for further information on our special preparations for interior and exterior finishes.

The Beckwith-Chandler Company
203 Emmett St., Newark, N. J.
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The Indianapolis Street Railway Company

now gives its patrons the service which is also offered you through the

READ-WYL-U-RYD

system of selling morning newspapers on all street cars

We know of no other added service so much appreciated by street car riders which is also a revenue producer for the street railway company without one cent of cost to them.

Now in operation at

Dayton, Ohio—City Railway Company
Dayton, Ohio—Peoples Railway Company
Dayton, Ohio—Oakwood Street Ry. Co.
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Dayton, Ohio—D. S. & X. S. Railway Co.
Springfield, Ohio—Springfield Railway Co.
Lima, Ohio—Ohio Electric Ry. Co.
Huntington, W. Va.—Ohio Valley Electric Ry. Co.
Danville, Va.—Danville Traction & Power Co.
Pueblo, Colo.—Arkansas Valley Ry., Lt. & Power Co.
Newport News, Va.—Newport News & Hampton Ry. Co.
Indianapolis, Ind.—Indianapolis Street Ry. Co.

Detailed information sent on request.

THE READ-WYL-U-RYD SERVICE

29 Patterson Bldg.
DAYTON
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U. S. PATENT
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The Ripolin Railway Eamel System provides a method of railway coach finishing possessing advantages that you will immediately recognize.

It is built around the following group of enamels and undercoats that have earned for Ripolin its international prestige as the standard of the world:

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LABOR — TIME — MATERIAL — MONEY



Since adopting the Ripolin Railway Enamel System according to our recommendations, one of the leading trunk lines of the country is now getting a better finish on its coaches in seven days and with but five coats, than was obtained formerly with eleven coats on a twenty-three day schedule.

Ripolin alone can give such results because it is unequalled in its

Marvelous Durability *Ease of Application*
Fine Lustre *Spreading Capacity*
Great Hiding Power



Ripolin keeps down to a minimum the time required for finishing your equipment and it keeps that equipment *on the rood longer* before refinishing is necessary.

WRITE, WIRE OR 'PHONE
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GLIDDEN
PAINTS — VARNISHES — STAINS — ENAMELS

We urge you to investigate this system which is producing astonishing finishing results because of the durability and brilliant finish that Ripolin provides.

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Easy Tripping, Close Adjustment, Great Capacity, Light Weight

Most Efficient Track Jack Yet Developed

This new single acting trip jack weighs only 52 lbs. It is therefore lighter in weight than most 10 ton jacks, yet has a capacity of 15 tons, and is by far the easiest operating track jack yet designed. A new tripping principle makes tripping surprisingly simple and easy. The whole jack has only 12 parts, all of sturdy, simple design, as against an average of 16 parts in other trip jacks.

Particularly close adjustment of height is easily obtained by novel "fingering down" feature, without the slightest danger to the operator's fingers.

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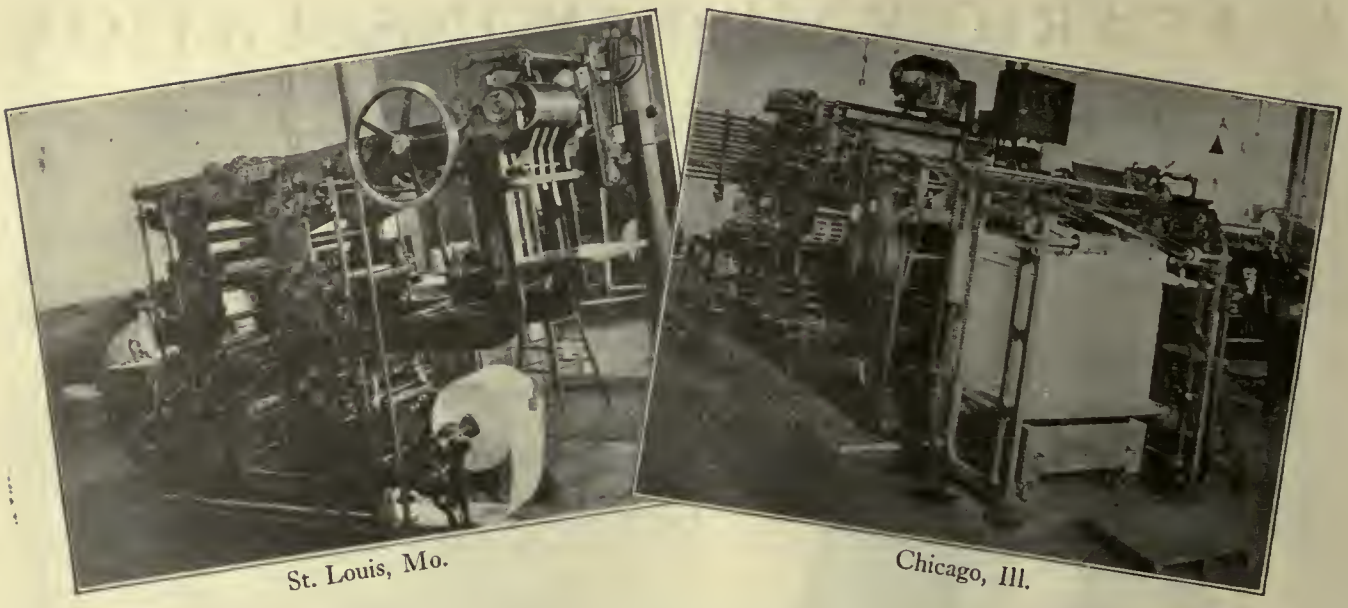
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Save money—print your own!

Nearly fifty per cent saving in transfer costs, is shown by actual figures published in the annual reports of the Chicago Surface Lines. Their transfer printing costs were reduced to 9.3 cents per thousand. Other roads using Meisel Presses make corresponding savings. A Meisel Transfer Press is more than a self-supporting investment, it is an economy-producing one.

The Meisel Press is not a job press—it is a printing equipment especially designed for electric railway work. Prints transfers, rebate slips, small notices and fliers.

Look into the possibilities of this machine for your own road. We will gladly have our representative call on you and show you what it can do.

Write for full details.

THE MEISEL PRESS MFG. CO., BOSTON, 25, MASS.


February 4, 1922

$1,000,000 Fire Damage

Ninety Cars Were Lost by the Chicago Surface Lines in Devon Carhouse on Jan. 26

Fire destroyed half of the Devon Avenue carhouse and seventy-eight passenger cars belonging to the Chicago Surface Lines on Jan. 26. Besides twelve miscellaneous service cars were lost. The intervention of steel rolling shutters between the sections of the carhouse saved ninety other cars and the portion of the building devoted to station facilities. The loss was

Kinnear Door after the fire

—SAVED the other MILLION DOLLARS

ALREADY a million dollar damage —one half the great car barn a seething cauldron, and the fire sweeping onward. Then it came to the Kinnear Doors—and stopped!

Ninety street cars and the remainder of the building had been saved. This represented a saving of over a million dollars. After 20 years of vigilance — of being on the job day and night — the Kinnear Rolling Doors of the Devon Avenue barns, installed in 1901 by the Chicago Surface Lines, were called on to show their true worth.

And in this they fully maintained the reputation of Kinnear Doors for over a quarter of a century as real protection against fire and thieving.

Protection of inestimable value — yet Kinnear Doors are so perfectly balanced and so carefully made they actually add to the efficiency of a building.



Let our engineering department tell you (without obligation on your part) how you can benefit by using

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Send your order now and start the service.

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The Monthly MAINTENANCE Issue

is focussed on the practical man, the man who uses the tools, the man who handles the materials, the man who puts in and keeps up the equipment of the track, line, shop and power departments. An issue devoted *wholly* to articles and items on the physical property, its installation and maintenance, its economy and its service value.

It will reach a thousand additional readers,—foremen and minor executives. It is read by the men who are on the ground supervising the work.

Coming in the Monthly Maintenance Issue:

1. Articles of a broad survey nature, covering methods of many of the leading companies, which will help the railways to put into use the latest and best maintenance practices.
2. Articles that will help the manufacturer to service his equipment.
3. Articles that will show the savings that have been made by discarding old tools and equipment, and substituting modern devices and apparatus.

Creates Buying Habits Among Readers

Because:—instructive, informative buying information is furnished to the reader.

Because:—bigger space in this issue backs up your advertising in the other weekly issues. It is a low-cost addition to your sales force doing missionary work of immense practical value among the workers in the ranks of the industry.

Because:—the foreman or the mechanic of today is the department head of tomorrow.

Because:—the influence and opinion of the man on the job, is now a well-recognized factor in the choice and purchase of equipment.

Because:—the man on the job can make or mar the success of your equipment after it is installed. Educate him and cultivate his good will.

ELECTRIC RAILWAY JOURNAL

C. Monroe Smith, Advertising Manager

Published by

McGraw-Hill Co., Inc., New York, N. Y.

[1] A complete list showing the correct name of every recorded electric railway company in the United States, Canada and Mexico, arranged by States and Cities.

[2] Address of each company.

[3] Names of affiliated and controlling corporations.

[4] Names of principal communities on routes.

[5] Names and addresses of corporation officers and principal department heads, including purchasing agents.

[6] Names and addresses of holding or controlling companies and lists of properties controlled by each.

[7] Names and addresses of consulting engineers, if any.

[8] Addresses of power plants and repair shops.

[9] Number and make of generators, stating capacity, voltage, whether d.c. or a.c., and if a.c., phase and cycles.

[10] If water power is used, horsepower and make of hydraulic turbines.

[11] If steam power is used, horsepower and make of boilers and engines.

[12] If gas or oil engines are used, horsepower and make.

[13] Transmission voltage.

[14] Trolley voltage.

[15] If energy is purchased, from whom.

[16] Number and capacity of substations, number of rotary converters and motor generator sets used.

[17] Amusement parks reached, whether owned or controlled by company.

[18] Mileage of the road, owned, leased and trackage rights.

[19] Miles in paved street.

[20] Gage of track.

[21] Number and kind of rolling stock used.

[22] Number of one-man cars.

[23] Rates of fare.

[24] Doing a lighting business.

[25] Date of latest information.

[26] Names, officers and executive committees of Electric Railway Associations, arranged alphabetically by name.

[27] Names, commissioners and principal assistants of National and State Railroad and Public Utility Commissons, arranged alphabetically by States.

[28] Statistics showing extent of the industry.

[29] Alphabetical list of Electric Railway Officials, indexed for company connections.

[30] Alphabetical index to companies.

Now Ready

A completely revised edition fully up to date and including new data not published in previous editions:

McGraw Electric Railway Directory

February 1923

The only source of complete data regarding personnel and plant of electric railway properties of the United States, Canada, Mexico, U. S. Possessions and West Indies.

Five Dollars Per Copy
Prepaid Anywhere

Order your copy on five days' approval and see for yourself how valuable this book is.

Directory Department
Electric Railway Journal
Tenth Avenue at 36th Street, New York

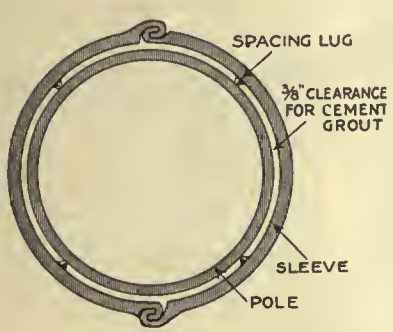
Drew Protective and Reclaiming Pole Sleeves

Corrosion of steel poles at the ground line goes on day and night, year after year. It weakens the poles and makes them a standing menace to service and the safety of the public. Replacements with new poles are costly and accidents are costlier still.

During the past twelve years, more than three hundred properties have used the Drew Malleable Iron Pole Sleeve for the rejuvenation of steel poles which were corroded at the ground line. The first cost is low, little labor is required for installation, and the repaired pole is good for a life at least as long as a new one.



This illustrates the salvage of a tubular steel pole which had rusted nearly through.



Disturbing The Overhead

is simply an expense. Why do it? Put that money into permanency. A malleable iron sleeve is much better than a steel sleeve and the interlocking slide feature of Drew Sleeves permits their application quickly and easily without disturbing the overhead. They are made in 30-in. lengths for poles 5 in., 6 in., 7 in. or 8 in. diameter at the bottom and also in 24-in. lengths for poles 6 in. or 7 in. diameter at the bottom.



Four 3/8-in. lugs near the top and bottom provide equal spacing around the pole as shown at the left and permit filling the space between the sleeve and the pole with cement, which is poured into the space in a thin mixture. This gives a bonded, uniform surface that equalizes the strain over the entire length of the sleeve.

The season for pole repair or replacements is at hand. Don't replace. At least, consider the big savings to be gained by using the Drew Sleeve. We can furnish you details that will be convincing. Write today for the facts.

DREW

Other Drew Products

Complete Line Direct Suspension and Catenary Material
Reclaiming Pole Sleeves
Pipe Insulators
Third Rail Insulators
High Tension Porcelain
Motorman's Safety Mirror
Pole Line Hardware
Linemen's Tools
Bronze Castings

MEMBER AMERICAN ELECTRIC RAILWAY ASSOCIATION AERA

The Drew Electric & Mfg. Co.
CLEVELAND, OHIO.

ANDERSON Equipment Insure Satisfactory Service

Now for Spring Weather and Rehabilitation *with Anderson Specialties*



Lindall Brush Holder

LINDALL BRUSH HOLDERS give perfect contact by constant brush pressure contact between brush surface and commutator. This lengthens the life of your commutator and gives better commutation. The long sweep of the double arm compression spring allows instant response to any surface inequalities in the commutator. With Lindall Brush Holders installed, there are no pigtails, no screws to work loose and no trouble, as brush is easily removed or inserted.



Round Top Straight Line Suspension

ANDERSON ROUND TOP STRAIGHT LINE SUSPENSIONS are especially strong, both electrically and mechanically. Line Foremen prefer them.



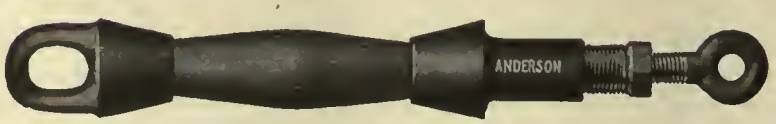
Anderson Crossovers

ANDERSON CROSSOVERS are scientifically made to insure long wear of both crossing and wires. The approach ears of bronze are pivoted to the main casting permitting them to rise slightly with the approach of the trolley wheel, thus taking the wear off the wire at the point subject to the greatest injury. This positively prevents crystallization and the subsequent breaking of the trolley wire at cross-over points.



Canopy Switch

ANDERSON CANOPY SWITCHES have replaced ordinary circuit breakers on thousands of cars because they are quick in action and they never stick. An insulating housing of vulcanized fibre makes it impossible to come in contact with the live parts when the switch is closed. A direct pull is always assured by means of a swivel handle and it is this feature that the motorman likes so well.



Double Take-Up Wood Strain Insulator

ANDERSON DOUBLE TAKE-UP WOOD STRAIN INSULATORS absolutely prevent twisting of the guy Wire. Moreover they reduce the time in taking up slack to just one-half. Finally they combine the essential features of unlimited insulation, great tensile strength and perfect adjustment.

A letter will bring you our latest catalog and prices on Anderson Specialties.

TRADE A MARK

Reg. U. S. Pat. Off.

Albert & J. M. Anderson Mfg. Co.

Established 1877

289-293 A St., Boston, Mass.

Branches—New York, 135 B'way. Philadelphia, 429 Real Estate Trust Bldg. Chicago, 105 So. Dearborn St. London, 38-39 Upper Thames Street, E. C. 4.

TRADE E A MARK AETNA REGISTERED

IN YOUR BUDGET

Deciding About That Track
—OLD or NEW, is EASY

The best is the cheapest—and when the cheapest is the best no need to hesitate. Get prices on the "Ideal Track" the "Continuous Rail" kind, that is

"Jointless", "Bondless" and "Costless"

Indianapolis Welded Joints.....Exterminate maintenance
Indianapolis Welded Joints.....Low in cost, high in efficiency
Indianapolis Welded Joints.....Super-rail, strength and conductivity
Indianapolis Welded Joints.....Any rail, anywhere, any time
Indianapolis Welded Joints.....Proven in performance—10 years' test
Indianapolis Welded Joints.....In use on over 125 different rails
Indianapolis Welded Joints.....In 200 cities, 48 states
Indianapolis Welded Joints.....The last word in track economy

INDIANAPOLIS *Welded Joints*

Applied with the Indianapolis Electric Welder and with Indianapolis Fluxated Welding Steel.

Insures Dependable, "Continuous Rail Track," the only kind of track that will ELIMINATE MAINTENANCE, PRESERVE PAVING, CONSERVE CARS

Thoroly Dependable—Inexpensive—No Bolts—No Bonds—No Maintenance.

The Proof of the Product Is In the Performance

ONE SAYS: Have installed 3,000 pairs since 1917. Thoroly satisfactory and efficient in every respect. Economical and adopted as standard.

ANOTHER SAYS: Have over 6,000 pairs, first installed in 1913, consider them thoroly practical and satisfactory, standard with us.

ANOTHER SAYS: About 2,500 pairs installed since 1907, with very gratifying results.

ANOTHER SAYS: Installed 2,400 pairs, beginning in 1916, with very satisfactory results.

ANOTHER SAYS: Since 1912 have used about 3,000 pairs, standard for our paved tracks.

ANOTHER SAYS: Only begun in 1919, with 500 pairs, uniformly good results.

ANOTHER SAYS: Joints welded in 1916, no maintenance and track apparently "Jointless" today.

ETC., ETC., ETC., ETC., ETC., ETC., ETC.

That "INDIANAPOLIS" *Welders, Steel and Joints*

ARE GOOD, is our claim. That they DO GOOD, is your opportunity. That they have MADE GOOD, is conclusively proven, in that many properties owe their present existence to the use of these products, which are saving hundreds of roads, MILLIONS of DOLLARS ANNUALLY.

To Users—The MORE you USE the MORE you SAVE
To Not-Yet Users—JOIN THE SAVERS

Get our proposition for comparison

The Indianapolis Switch & Frog Co.

SPRINGFIELD, OHIO

J. J. Costello Boston, Mass. New England Representative



"That Results may b

Few persons outside of those directly involved in the profession of Car Advertising stop to consider the amount of cultivation—or maintenance, if you please—it is necessary to devote to car card space in order to prepare it for use by the advertiser.

The Car Operator has his problems of power houses and power transmission, tracks and trolley construction, car houses and shops, and cars, all to be created and maintained to serve his patron.

So the successful Car Advertising Operator must provide artists, copymen, merchandise men, solicitors and carders, backed by an organization of experts in each of these lines of endeavor, in order that the blank space may be turned into an earning asset for the railway companies.

Barron G. Collier
INCORPORATED

obtained"—

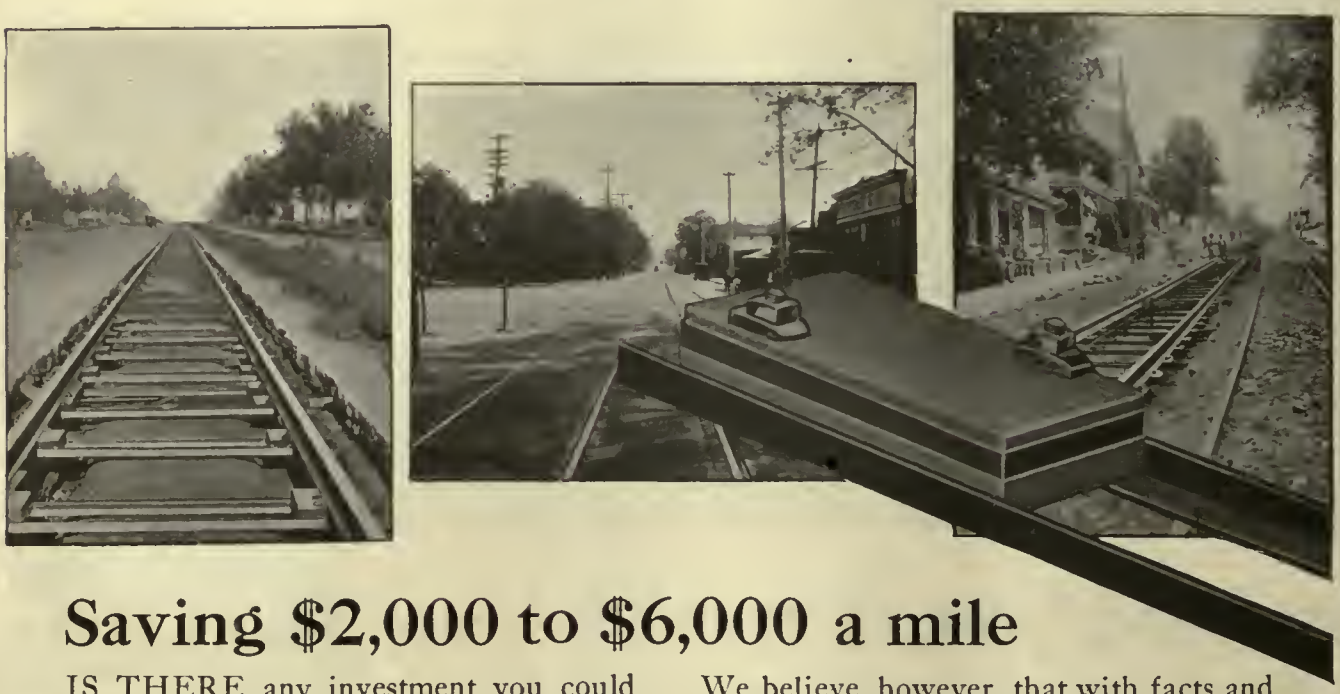
Slowly and scientifically, over a long period of years, Collier Service, through its service to advertisers, has cultivated and maintained the value of the field of car card advertising.

Thousands of advertisers served; millions of cards printed; hundreds of slogans, names, trademarks created through our seventy-four branches throughout the United States—these are but a few of the elements that are embodied in Collier Service.....

—these are but a few of the many reasons why the field of Car Card Publicity as conducted by Collier Service is entitled to receive the fullest cooperation of the Railway Operator.

Barron G. Collier
INCORPORATED
Candler Bldg.,
New York

No finer tracks were



Saving $2,000 to $6,000 a mile

IS THERE any investment you could possibly make which would pay anything like as large a return?

Think it over in these terms—

A saving of $6,000 per mile over wood ties in concrete!
A saving of $2,000 per mile over wood ties in gravel ballast!
Giving far longer life to the track—
Reducing track and paving repairs—
Reducing upkeep in rolling stock—
Reducing traffic noises.

These are the separate elements of economy which go ino every purchase of Resilient Ties.

The time for track building and track rebuilding is nearly here; thinking in terms of costly wood-tie construction you have perhaps felt that you couldn't afford to undertake construction for which there is real necessity.

We believe, however, that with facts and figures before you on the much lower cost of Resilient Tie construction, you will not only see your way clear to make the absolutely necessary track renewals but can definitely plan for track extensions as well.

These facts and figures as adapted to your particular problems are at your disposal any day you may care to take the matter up with us.

We can show you conclusively where you can put down *better* track for much *less* money than you had any idea of spending. A request for these figures as applied to your particular problems will not put you under any obligation at all.

We want you to know and

IT WILL PAY YOU TO KNOW

DAYTON

ever built



Permanent—Easy riding—Economical, and put in at a saving of from $2000 to $6000 a mile.

Resiliency is the coming thing in track construction.

It's simply the application of the century old principle of shock absorption for dissipating the terrific hammer blows of heavy equipment pounding over a solid foundation. Dayton Mechanical Ties are built on sound principles and are fundamentally correct. That's been proven by the ever increasing number of installations that are going in year after year in every section of the country.





Get all the facts on Dayton *Resilient* Ties. A two-cent stamp now may save you thousands of dollars next month or next year. Let us tell of the experience of dozens of cities who have so successfully used this type of construction.

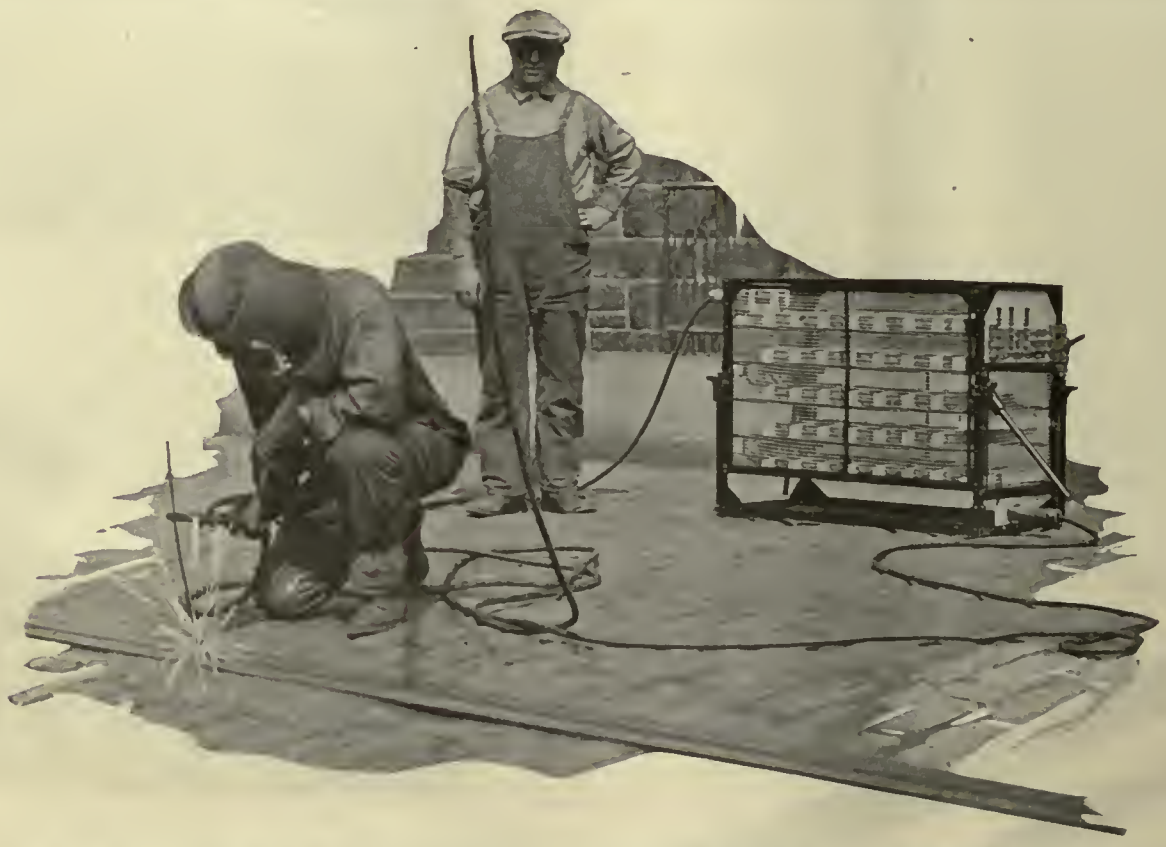
CUSHION THE SHOCK ON THE ROLLING STOCK

The Dayton Mechanical Tie Co.
707 Commercial Building, Dayton, Ohio
Canadian Representative:
Lyman Tube and Supply Co., Ltd, Montreal, Quebec



Resilient TIE

How "Maintenance of Way" can



AJAX ELECTRIC ARC WELDER

For Rail Welding and Bonding

Cars are rattled, shaken and battered by cupped joints and by worn or broken special work. Building up such track again, to proper shape and alignment, by electric arc welding is now the recognized way of economically obviating this condition.

The "Ajax" Electric Arc Welder has been developed and placed on the market to meet the insistent demand for something to replace the heavy, complicated and often unsuccessful equipment that has been tried by many railway companies and found impractical.

Here is a machine which is so light and compact that it can be carried on a passenger car or on the smallest automobile. It is simplicity itself both in operation and maintenance. Its ability to make deep strong welds, even with the poorest trolley voltage has been the biggest factor in securing its present wide-spread use.

The price will interest any road. Ask us!

SPECIFICATIONS

Weight—only 155 lbs.

Dimensions—18 in. x 28 in. x 36 in.

Capacity—333 amps. at 600 volts.
—200 amps. at 300 volts.

Control—Switchboard attached.

Equipment—Electrode Holders.
—Trolley Pole.
—Cables.
—Face Shield.
—Canvas Cover.

Write for circular and prices

RAILWAY TRACK-

3132-48 East Thomp

AGENTS:

Chas. N. Wood Co.
Boston

Atlas Railway Supply Co.
Chicago

Electrical Engineering & Mfg. Co.
Pittsburgh

save "Maintenance of Equipment"

Smooth-Riding Track Reduces Car Repairs

Just as the back-woods corduroy road will put your automobile in the repair shop far more frequently than the even asphalt pavements of the city, so also will the corrugated rails, the cupped joints, and broken special work lay your cars up for more numerous and more costly overhaulings.

It can't be otherwise. A modern car is a complicated piece of equipment, full of intricate and often delicate mechanisms and parts all closely interrelated. When it is pounded over irregular track at high speeds, something is bound to give.

Make your tracks smooth and even, and keep your cars out of the shop. You don't have to reconstruct your track to do it. Welding and grinding now-a-days is putting many a mile of almost despaired-of tracks into good operating condition again.



UNIVERSAL
Rotary Track Grinder

Distinctive among grinders of the rotary type because of its tilting grinding wheel feature. This permits reaching any part of the work, and grinds at any angle in the rail head, thus affording accurate finishing to conform to shape of rail. Easily moved to let cars pass.

ATLAS
Rail Grinder

An inexpensive rotary grinder especially suited for following up the welders, and removing surplus metal. It is light, fast and efficient, simple to operate and satisfactory in its work. Rubber-tired derail wheels permit easy moving.

RECIPROCATING
Track Grinder

This is the machine which is beating the corrugation evil on hundreds of roads. Several companies have ten or more always at work, weather permitting. Any laborer can operate it, without possibility of injuring the rail. Removes minimum necessary metal to eradicate the corrugations.

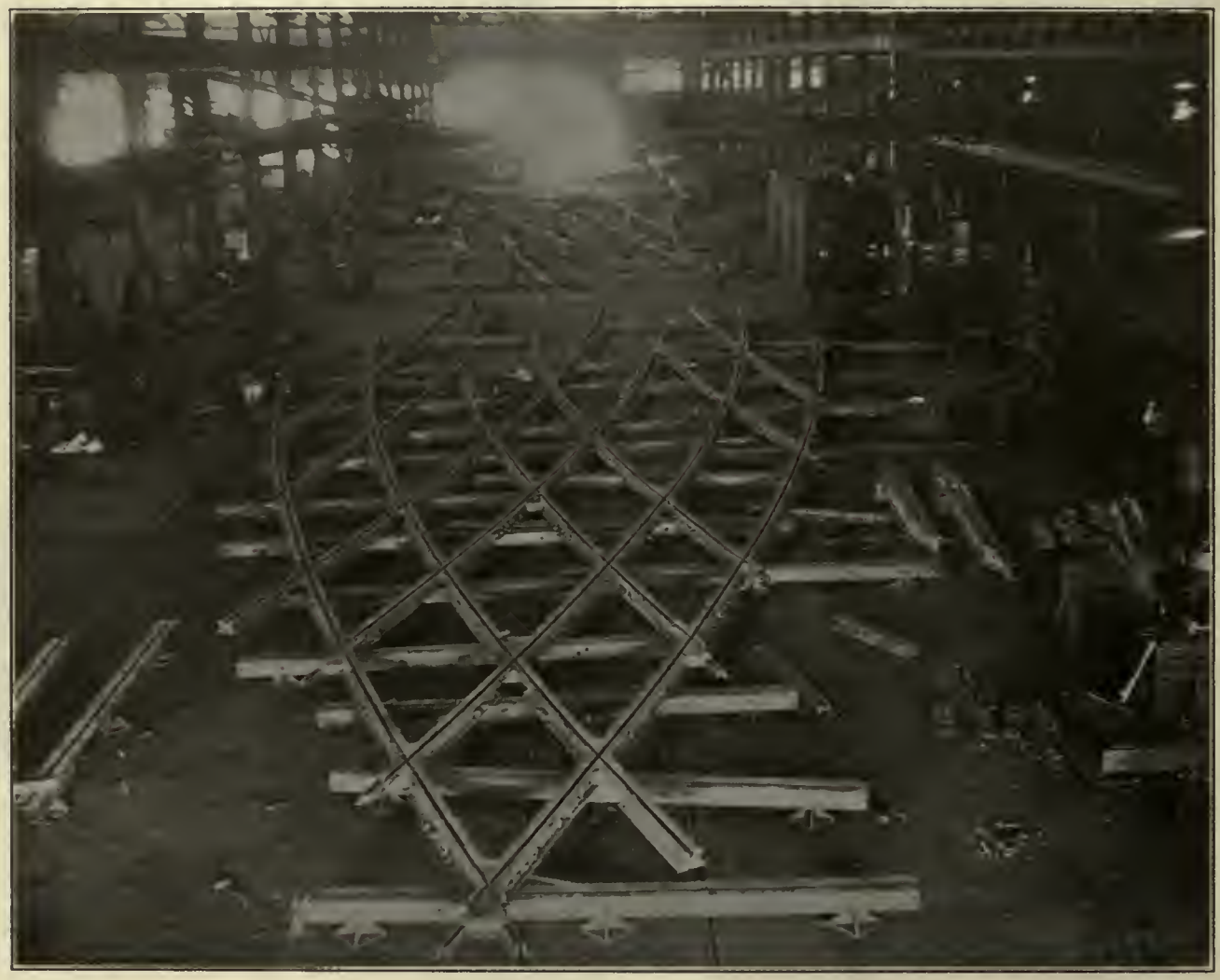
WORK COMPANY

son St., Philadelphia, Pa.

P. W. Wood
New Orleans

Equipment & Engineering Co.
London, Eng.

We've blazed the



Part of Terminal Layout
The frogs shown are of our Short Length Solid Manganese Steel Construction

WHARTON
SPECIAL
TRACKWORK

way for 64 years

We manufacture street railway special trackwork of all constructions, especially that of Manganese Steel.

Wharton Quality Special Trackwork has successfully met the requirements of enduring service since 1859.

WM. WHARTON, JR. & CO., INC.
EASTON, PA.

SALES OFFICES:

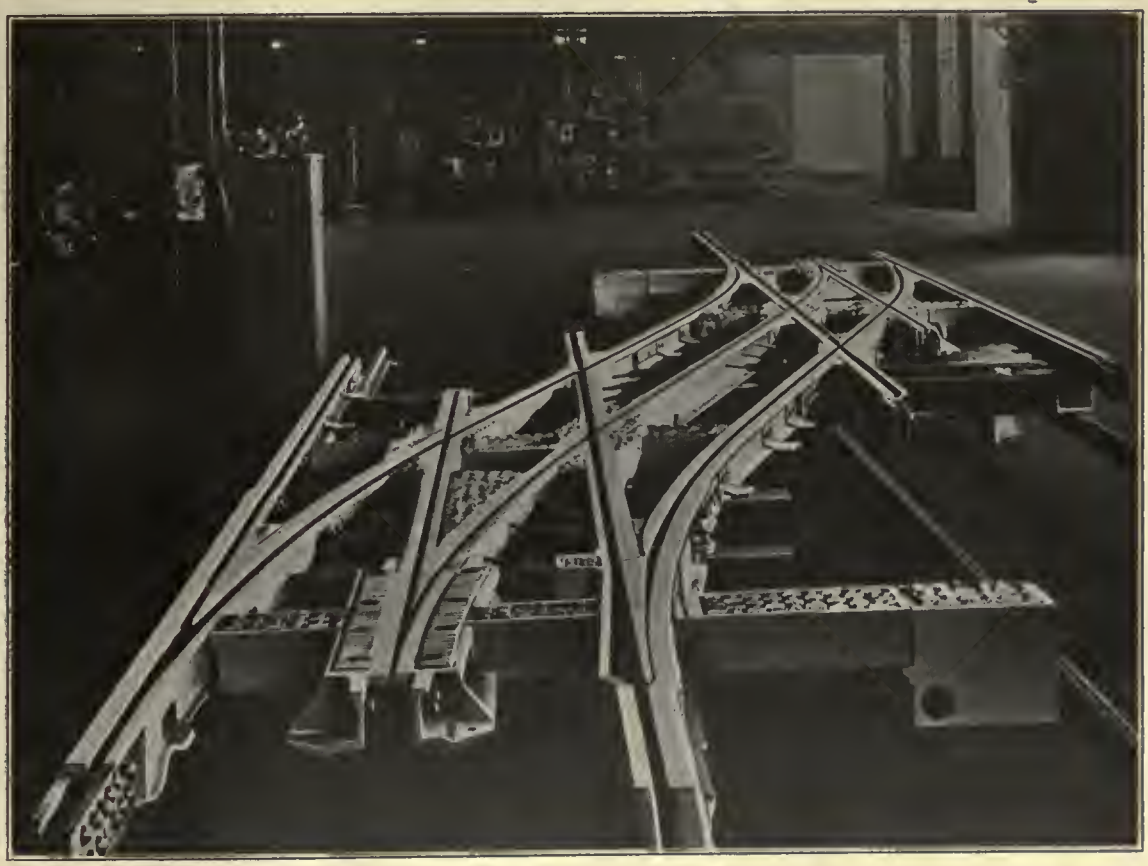
Boston, Mass. Chicago, Ill. Denver, Colo. New York City Philadelphia, Pa. Pittsburgh, Pa. San Francisco, Calif. Scranton, Pa.

OTHER PLANTS

Taylor-Wharton Iron & Steel Co. High Bridge, N. J.

Philadelphia Roll & Machine Co. Philadelphia, Pa.

Tioga Steel & Iron Co., Philadelphia, Pa.



Slotted Crossover
Switches of Solid Manganese Steel
Mates and Wheel Frogs Solid Cast Steel
with Manganese Steel Centers

Reliable Brushes *for* Electric Traction



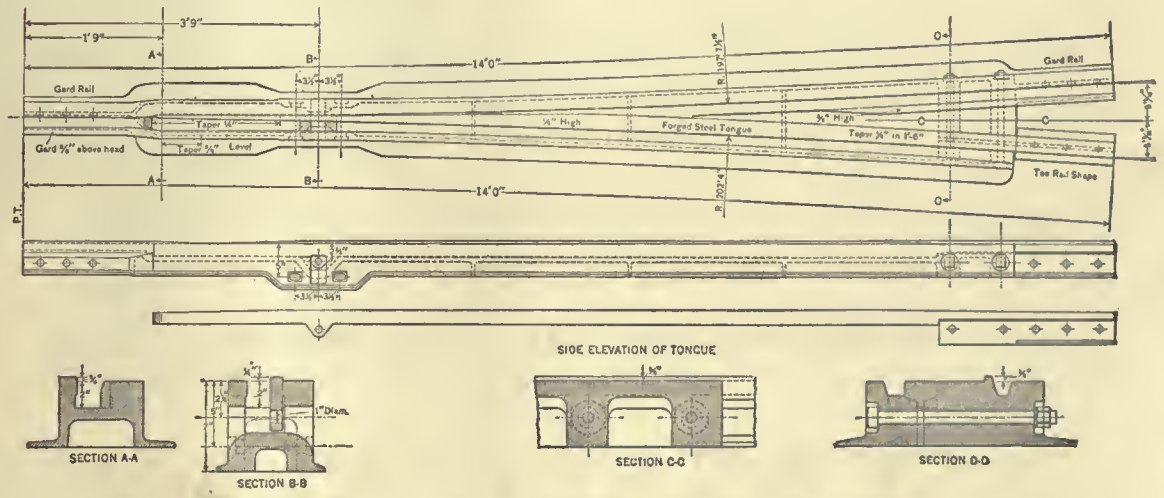
To obtain uniformly excellent results from standard railway motors with slotted commutators on both city and interurban service

USE GRADE No. 402

NATIONAL CARBON COMPANY, INC.
Cleveland, Ohio San Francisco, Cal.

THE LORAIN STEEL COMPANY





Folsom Tongue Switch

Suitable for use in Turnouts for one-way car movement. This switch is placed on the left hand side entering turnout for right hand car movement. The point is constructed to act as a spring switch without the use of the usual spring box. The main casting is steel and tongue rail is forged.

Made under Patent July 4, 1922

The Lorain Steel Company

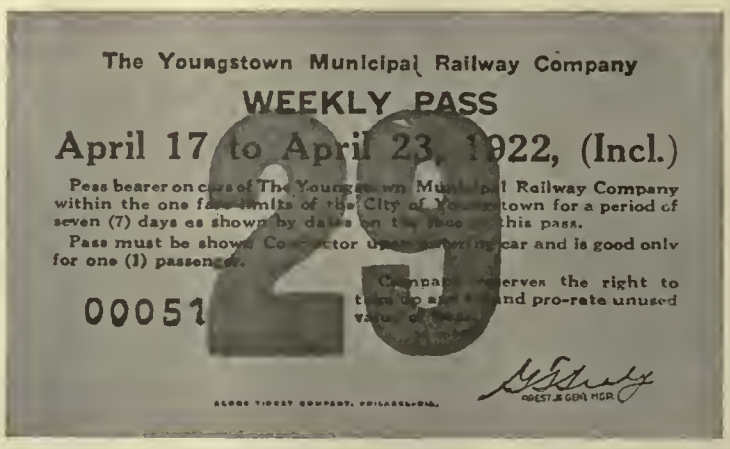
General Offices: Johnstown, Pennsylvania

Sales Offices:

Atlanta Chicago Cleveland New York Philadelphia Pittsburgh

Pacific Coast Representatives: U. S. Steel Products Co., San Francisco, Seattle, Portland, Los Angeles
Export Representatives: United States Steel Products Co., New York





Globe Tickets "all ways"

And "all ways" is right, too.

Some of the varieties of Globe Tickets include Fare Tickets in strips or books, Transfers, Weekly Passes and Cash Fare Receipts. And all of these various kinds of tickets are made exactly in accordance with the ideas and needs of the Company buying them.

There is no denying that the commutation idea of selling tickets helps to build business. But even though they pay the full rate of fare, patrons prefer to use tickets. It saves carrying change, and avoids the necessity of always trying to "have the exact fare ready." These are some of the difficulties that Globe Fare Tickets help to overcome.

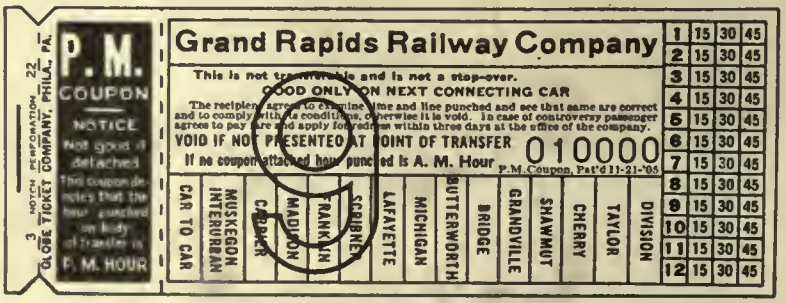
Globe P. M. Coupon Transfers, Weekly Passes and Cash Fare Receipts all have their virtues, too. In fact, many Electric Railways consider them indispensable.

Globe Ticket Company

112 N. 12th Street, Philadelphia, Pa.

Branches:

Los Angeles **New York** **San Francisco**







Lightest Weight Walkover Steel Seat



Standard Rattan Walkover Steel Seat



Lightest Weight Stationary Steel Seat

Your Passengers Will Appreciate

Hale & Kilburn Seats

The acknowledged standard for

City Cars **Buses**

Interurbans

Best Seats for

One-Man Safety Cars

Highest quality at lowest price

Write for Quotations.

HALE & KILBURN CORPORATION
American Motor Body Company, Successors
PHILADELPHIA

New York Chicago Washington Atlanta Los Angeles



Find Out Why!

—it pays to paint Equipment and Rolling Stock the "SPRACO" Way

Learn the big money-saving,—time-saving, —labor-saving advantages of Spraco Pneumatic Painting Equipment;—especially as adapted to the upkeep and maintenance of Electric Railway Systems.



Pictures Tell Part of the Story

BUT—how "SPRACO" surpasses old-fashioned methods in speed, economy and quality of work can best be shown by facts and figures, based on records of experience.

How "SPRACO" Paint Guns reach every crack. cranny or crevice—no matter how inaccessible; how they spread a uniform, long-wearing coat of any protective liquid on any kind of surface—the equivalent of two coats if desired; how "SPRACO" speeds up production and cuts down costs—



These and the many other uses and advantages of "SPRACO" Pneumatic Painting Equipment are yours in detail for the asking.

A card or letter *Today* will promptly bring you the answer to *why* it pays to paint the "SPRACO" Way

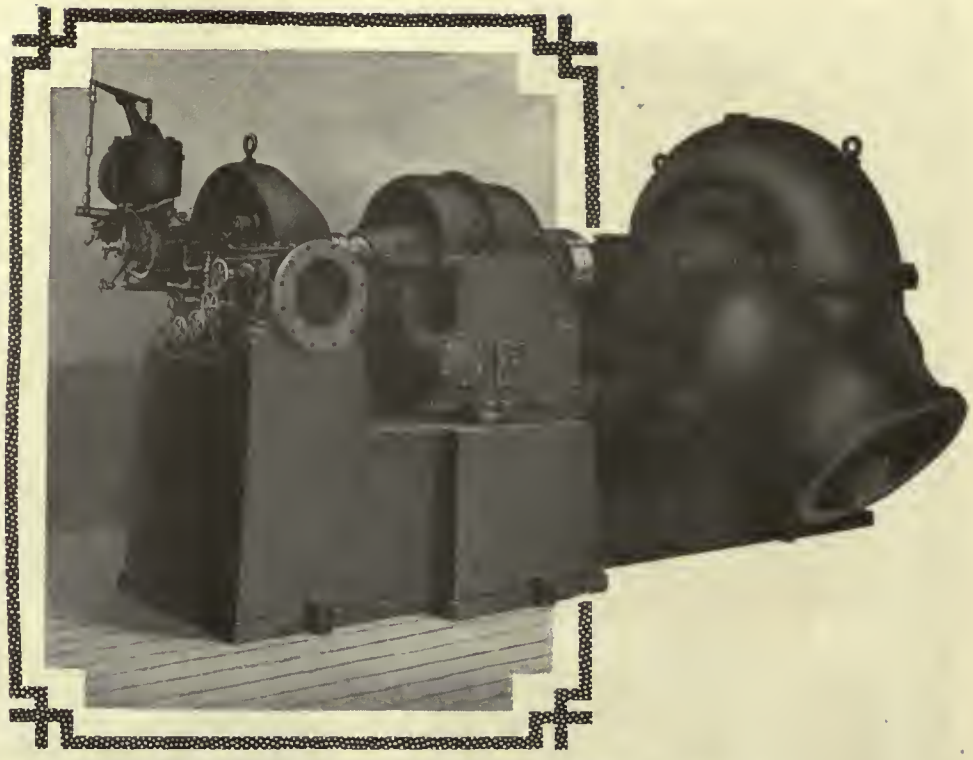
Send for "SPRACO" Bulletin P-71

SPRAY ENGINEERING COMPANY

60 High Street, Boston, Mass.

Engineers for
Spray Cooling Systems
Irrigation Systems
Aerating Reservoirs
Air Conditioning
Gas Washing

Manufacturers of
Air Washing Equipment
Spray Cooling Equipment
Paint Spraying Equipment
Flow Meters
Park Sprinklers



Where DEPENDABILITY PAYS

THERE are two auxiliary units in the power plant which cannot shut down without causing an interruption of service of the main unit or units which they serve. Even standby apparatus cannot be started soon enough to prevent an interruption.

The above illustration shows a Terry turbine-driven geared condenser circulating pump which was supplied to the Chile Exploration Co. If this unit should shut down, the main unit which it serves would run non-condensing momentarily, heating the condenser shell so that it would be dangerous or ruinous to the condenser to start up a standby unit. It would be necessary to shut down the main unit long enough to permit the condenser shell to slowly cool to the proper temperature.

Turbines are chosen for this class of service primarily because of their inherent dependability. They receive their energy directly from the boiler, avoiding the cycle of main unit or house turbine, generator, switchboard, fuses and wiring required by motors.

Terry Turbines are specified because of their many features of simplicity, durability and the small amount of attention required to keep them in efficient operation.

Investigate these features, and for your plant, specify

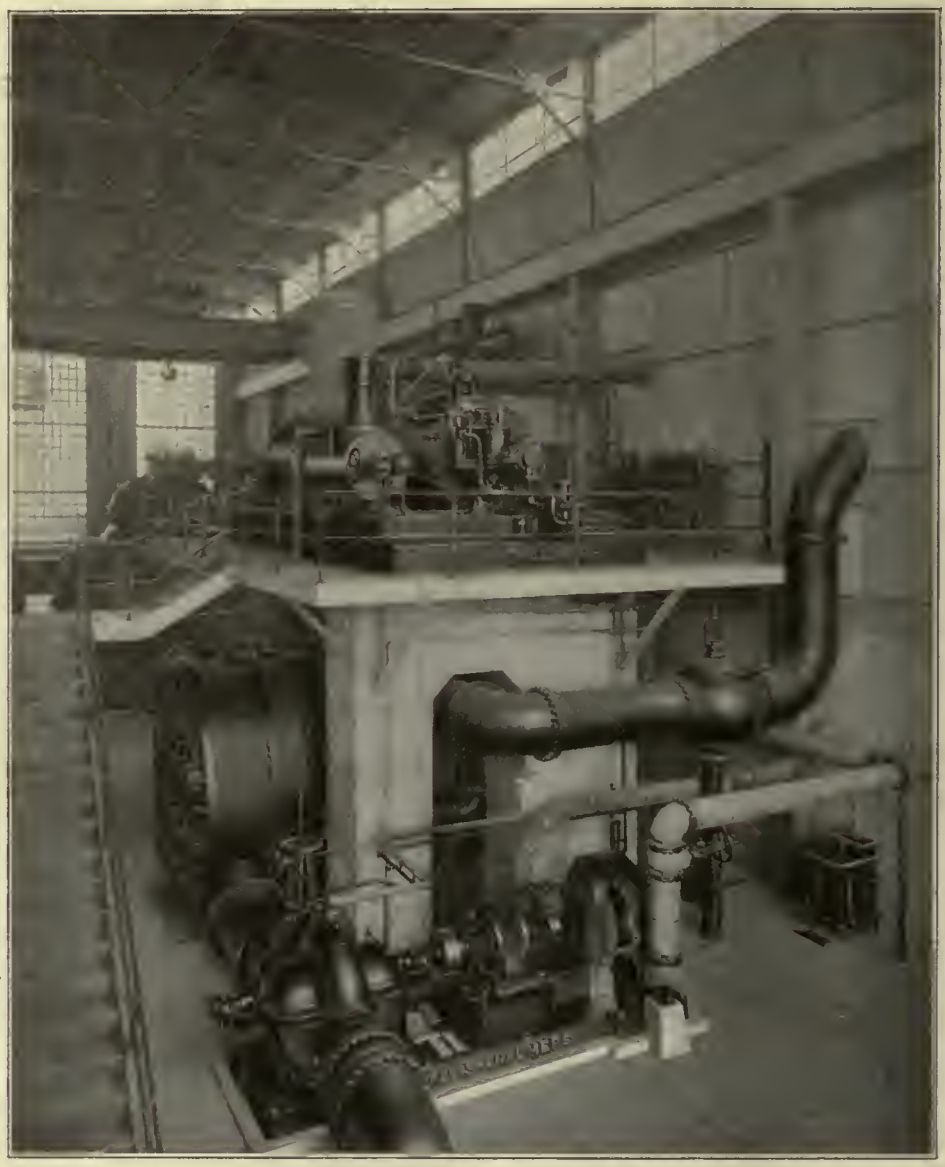
T-763

THE TERRY TURBINE



Offices in Principal Cities in U.S.A. also in Important Industrial Foreign Countries

The Terry Steam Turbine Co.
Terry Sq. Hartford, Conn. U.S.A.



12,500 K.W. Steam Turbine Generator Unit, complete with Surface Condenser, Turbine-driven Circulating and Condensate Pumps, all of Allis-Chalmers manufacture.

Serving Public Utilities

Many public service companies testify to the advantages and appreciable savings under the Allis-Chalmers plan of "Undivided Responsibility," where the manufacturer assumes complete responsibility for the design, building and placing in operation of the principal equipment for the power plant.

Complete equipment "from prime mover to switchboard" is built by the Allis-Chalmers organization. This includes all types of prime movers—steam turbines, hydraulic turbines, steam, gas and oil engines, together with complete electrical equipment. Condensers of all types, pumps, air compressors and many other auxiliaries are also supplied. Allis-Chalmers equipment is used in plants of all sizes, and includes some of the largest power units ever built.

Let Allis-Chalmers Engineers Serve You.

ALLIS-CHALMERS PRODUCTS
Electrical Machinery
Steam Turbines
Steam Engines
Gas and Oil Engines
Hydraulic Turbines
Crushing and Cement Machinery
Mining Machinery

ALLIS-CHALMERS MANUFACTURING COMPANY

MILWAUKEE, WISCONSIN. U.S.A.

ALLIS-CHALMERS PRODUCTS
Flour and Saw Mill Machinery
Power Transmission Machinery
Pumping Engines-Centrifugal Pumps
Steam and Electric Hoists
Air Compressors - Air Brakes
Agricultural Machinery
Condensers



Edge Moor Boilers in the Cedar Rapids plant of Iowa Railway & Light Company.

17 Repeat Orders from Iowa Railway and Light Co.

27 Boilers—14,083 H. P.

THE Iowa Railway & Light Company ordered its first Edge Moor Boilers in 1909.

Seventeen times since then, they have purchased Edge Moor Boilers. Twenty-seven boilers, totalling 14,083 H. P., are installed in four of this company's stations—15 boilers at Cedar Rapids; 4 at Boone; 4 at Marshalltown; 3 at Iowa Falls; one at Perry.

Repeat orders come only when worth has been proved. Some of the most convincing evidence of the *proved* value of Edge Moor Boilers is found in our sales records.

Tell us where to send you a copy of the Edge Moor catalogue.

EDGE MOOR IRON COMPANY

Established 1868

EDGE MOOR, DELAWARE

New York Chicago Boston Charlotte St. Paul Pittsburgh

EDGE MOOR Water Tube BOILERS

FOR INCREASED FUEL ECONOMY



Automatic
Type
Passimeter

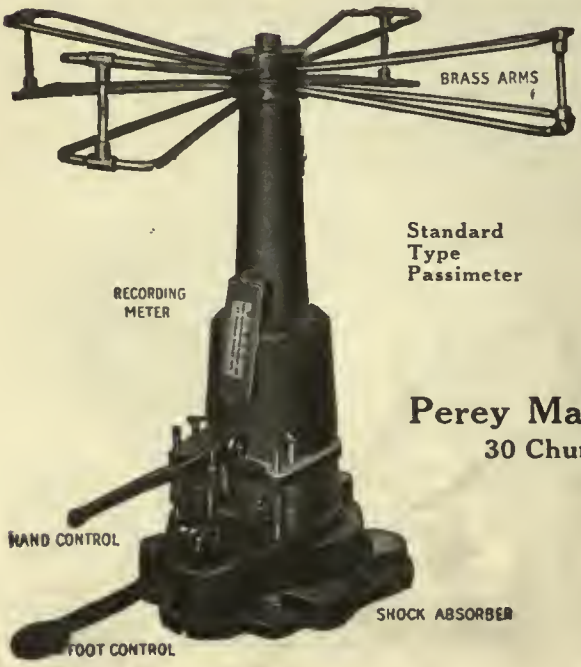


No. 10
Turnstile

Practical
Durable
Substantial

Perey Passimeters and Turnstiles
for Every Purpose

An accurate, efficient and reliable way to register fares and give you an exact count of all the passengers you handle. Used on many larger railroads.



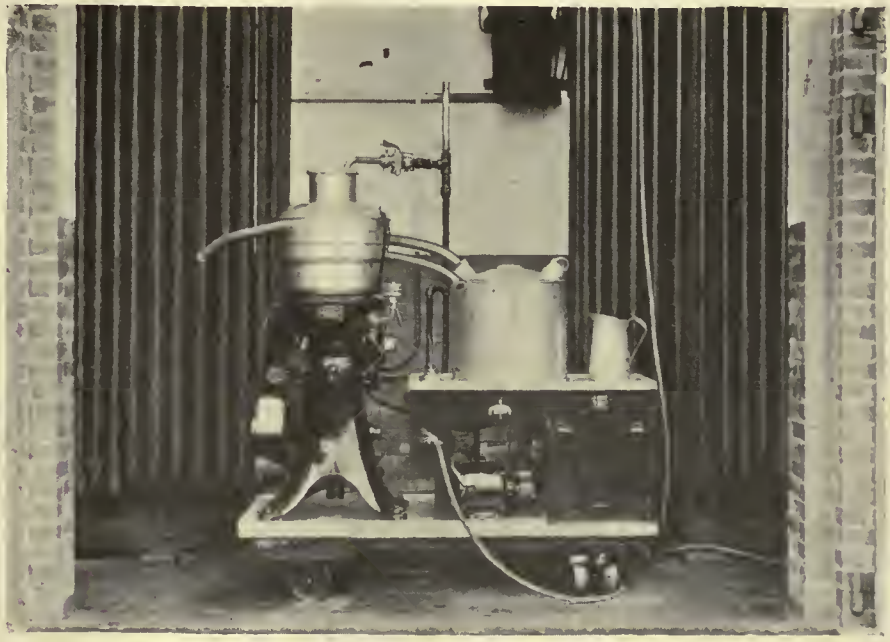
Standard
Type
Passimeter



Perey
Car
Turnstile

Perey Manufacturing Co., Inc.
30 Church St., New York City

De Laval Transformer Oil Purifiers economically maintain the dielectric strength of oil



THE great majority of transformer troubles can be traced to moisture in the insulating oil. That is why every transformer manufacturer urges upon users of his apparatus the necessity of regular dehydration. Frequent purification of the insulating oil lowers the operating temperature of the transformer and results in longer life for the unit.

The De Laval Transformer Oil Purifier provides a positive and economical means of keeping transformer oil, switch oil and that used for similar purposes free from moisture and sludge. It does its work entirely by centrifugal force, which eliminates the need for filter media. It is positive in operation, so that under all ordinary conditions but one passage through the centrifugal is required to raise the dielectric strength of the oil to 22 kv. or better when tested with the new-style gap.

When running oil containing a high percentage of water, the bowl or separating chamber of the machine may be assembled to continuously discharge both water and dehydrated oil. This feature avoids the necessity for frequent shut-downs while oil is being treated, and on oil of low dielectric does away with the need of a settling process before dehydration.

De Laval Transformer Oil Purifiers are furnished as stationary or portable units, the latter being equipped with all auxiliaries necessary to handle the oil. The economy and efficiency of these machines have resulted in their adoption by many of America's largest central stations.

Mail the coupon for complete information regarding this modern and economical method of dehydrating transformer oil.

The De Laval Separator Company

New York, 165 Broadway Chicago, 29 East Madison Street

DE LAVAL PACIFIC COMPANY
San Francisco

Sooner or later you will use a

De Laval

Please send Bulletin containing further information regarding the De Laval Oil Purifier as checked below.

- ☐ Purification of turbine lubricating oil.
- ☐ Purification of Diesel lubricating and fuel oil.
- ☐ Dehydration of transformer oil.
- ☐ Purification of car axle oil.

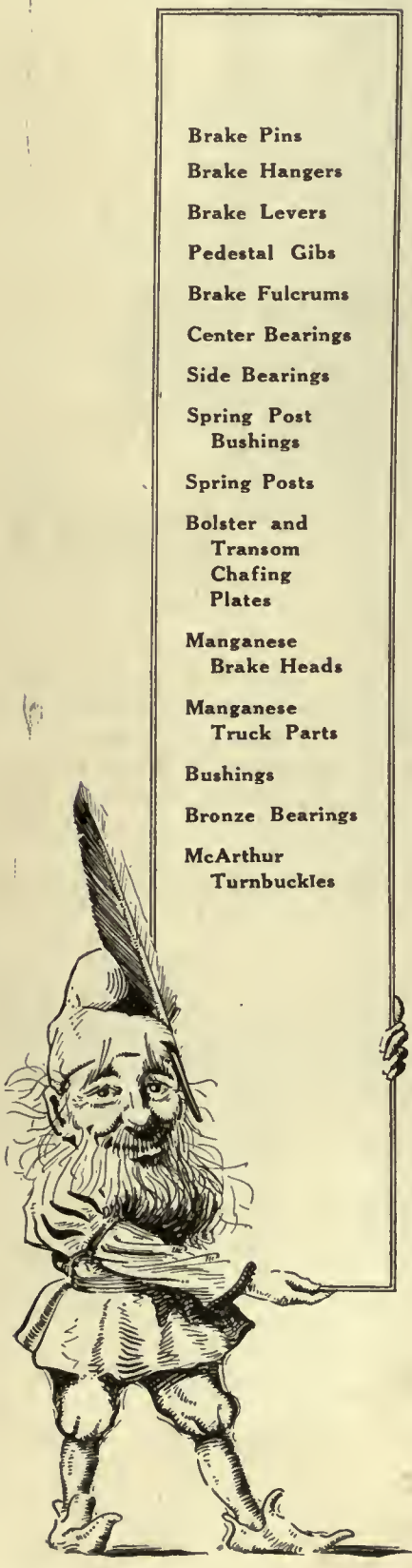
Name .....

Company .....

Address .....

E.R.J.

Says GEORGE W



"I attribute most
I am indefatigably
job. My work is the
obliteration of man's
since they started us
I've had one tough
send these specially
scrap-heap. They
as long as the old-
junk, and even then

Bemis Car

Electric

SPRINGFIELD,

Represen

ECONOMY ELECTRIC DEVICES CO.
Old Colony Bldg., Chicago, Ill.

F. F. BODLER
903 Monadnock Bldg., San Francisco, Cal.

WEAREN TEAR

of my success to the fact that persistent. I am always on the constant tearing down and work. But, take it from me, ing BOYERIZED Car Parts job on my hands trying to treated steel parts to the hold out ever so many times fashioned parts I used to some of 'em ain't licked!"

Truck Company

Railway Supplies

MASS.

tatives:

W. F. McKENNEY
54 First Street, Portland, Oregon

J. H. DENTON
1328 Broadway, New York City, N. Y.

A. W. ARLIN
772 Pacific Electric Bldg., Los Angeles, Cal.

PANTASOTE
TRADE MARK
AGASOTE
TRADE MARK

Standard for
Electric Railways

THE PANTASOTE COMPANY
PEOPLES GAS BUILDING, CHICAGO 11 BROADWAY, NEW YORK MONADNOCK BLDG. SAN FRANCISCO



1—No Wear Check Pawl
(perfect engagement)

2—Ratchet Wind

3—Emergency Release

4—Free Winding Tension Spring

5—Perfect Lubrication

These five features, exclusive with the Earll, enable it to fully do, day-in day-out, all that a catcher or retriever is expected to do—and that's a lot. How these features produce extra value and why they save maintenance money gladly demonstrated.

There's a model for every service.

C. D. Earll, York, Pa.

Canadian Agents:
Railway & Power Engineering Corp., Ltd., Toronto, Ont.
In All Other Foreign Countries:
International General Electric Co., Schenectady, N. Y.



Samson Spot Trolley Cord

—used for replacements of inferior cords, will result in fewer broken ropes, fewer jammed trolley catchers and elimination of other troubles. This means lower costs.

Samson Spot Trolley Cord is thoroughly waterproofed, smooth and hard. It does not swell or kink and is of uniform quality throughout. The colored spots,—our trade mark—are your guarantee of extra quality.

Samson Bell and Register Cords are likewise of highest quality and their use leads to lower maintenance costs in the long run.

Send for samples and prices.

SAMSON CORDAGE WORKS—BOSTON, MASS.



Hartman Center Bearing
New Plain Raceway



Paragon Side Bearing



Peerless Side Bearing
Two Piece



Perry Side Bearing
Double Roller Type

Detroit has equipped 250 Cars with HARTMAN CENTER PLATES

This action follows an exhaustive investigation of these plates as a means for saving power and improving Car operation.

BALL BEARING CENTER PLATES and FRICTIONLESS SIDE BEARINGS

Designed to suit all types of equipment

Reduce Wear on Wheel Flanges and Rails

Decrease Nosing

Prevent Derailments

Reduce Power Consumption

Allow Maximum Speed with Safety

Give Smooth Easy Riding Cars

A Trial Set Will Convince

The Burry Railway Supply Co.

1316 Peoples Gas Building, Chicago, Ill.

TERRITORIAL REPRESENTATIVES

Nic LeGrand, Rock Island, Ill.
W. McK. White, Goshen, Ind.
W. F. McKenney Co., Portland, Ore.
S. A. Roberts & Co., Salt Lake City, Utah
Chas. N. Wood Co., Boston, Mass.
H. F. Keegan Co., New York, N. Y.
Alfred Connor, Denver, Colo.
Wm. T. Campbell, Washington, D. C.
P. W. Wood. New Orleans, La.
E. A. Thornwell, Atlanta, Ga.
Frank F. Bodler, San Francisco, Cal.
Railway & Power Eng. Corp., Toronto, Ont., and Winnipeg, Man.

Increase Your Transportation Sales

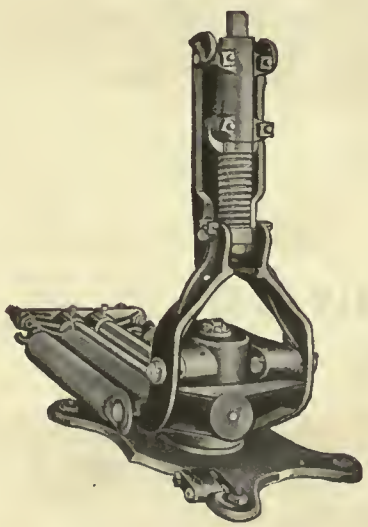
By Increasing the Efficiency of Your Service



"U" "V"







Keep Your Cars Always on Time by Using Bayonet Trolley Equipment

Bayonet Special Trolley Wheels

are made of the very highest grade of metal. No cheap alloys or old trolley wheels recast into new ones. All hand turned, insuring the greatest accuracy and balance. They are known all over the world for their superiority over other wheels, their economical and efficient service having been proved by competitive tests.

Bayonet Detachable Trolley Harps

are the only trolley harps with which you can change from wheel to sleet cutter or to a new wheel in TEN SECONDS. No tools required on top of the car; only your hand is necessary. All inspections, repairs, adjustments and lubricating are done at the work bench, where they are better done. This eliminates unsatisfactory patchwork on top of car, insures perfect running trolleys and increases your trolley wheel mileage at least 33⅓%. The original and only practical Non-Arcing Harp made.

Bayonet Trolley Base with Detachable Pole Clamp

is the only trolley base made on which the trolley pole can be changed in 30 SECONDS and the wheel be in perfect alignment, with the wire, and no tools required to do the job. Greatest flexibility of pole action is afforded by long extension springs, and self-lubricated bushings in bearings, and the roller bearing swivel gives freedom to the rotary motion. It is so constructed that you get a uniform wire pressure at all angles of pole. All wearing parts are quickly and cheaply renewed, making the main parts of the base everlasting.

Perfect conductivity is afforded by sliding contact between turret and base plate. It saves your overhead, your wheels and your wire by its freedom of action.

Bayonet Sleet Cutters

have no superiors in cutting ice from the wire. If the ice can be removed the Bayonet will do the job. We have the rigid and semi-rotary types (the kind you can back up with), both of which are detachable and interchangeable with the wheel. Only ten seconds necessary to make the change from harp with wheel to one with sleet cutter.

All Bayonet equipment sold subject to approval. You must be satisfied or your money will be refunded. Begin now to practice economy by using the Bayonet.

BAYONET TROLLEY HARP CO.

Springfield, Ohio, U. S. A.

BETTER THAN EVER

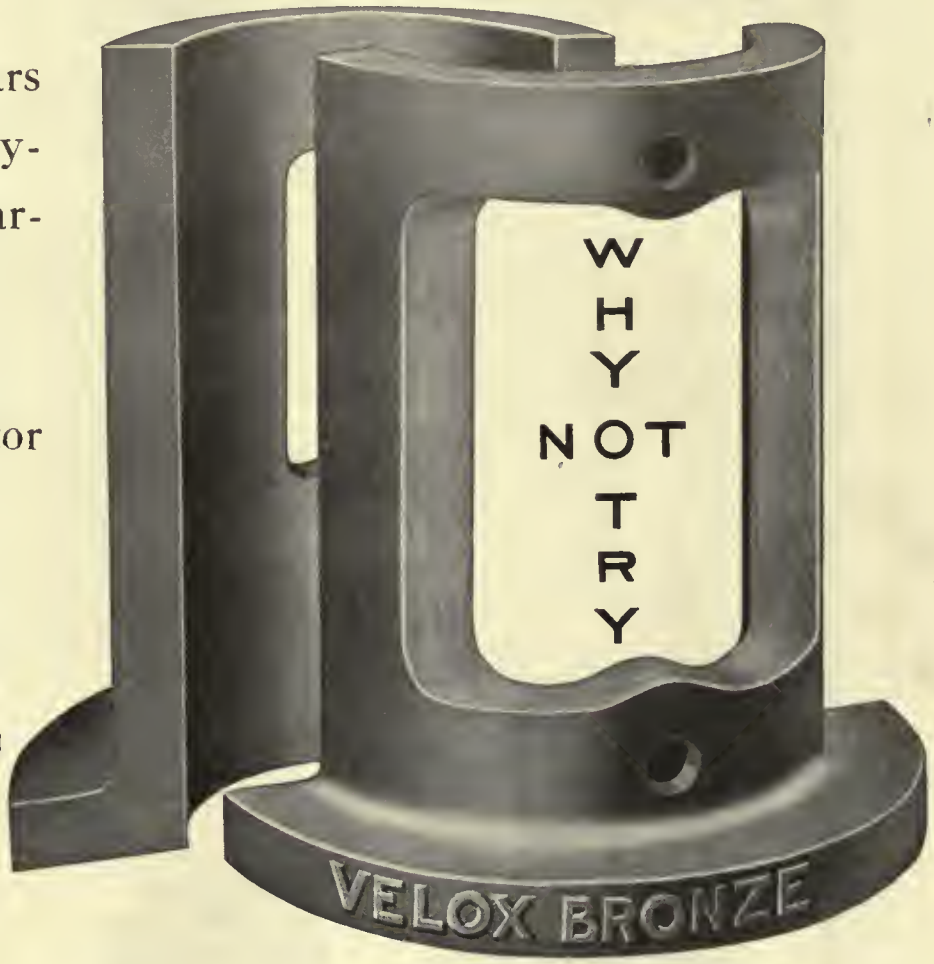
Accurate Bearings From Perfect Alloy Result in Longer Mileage At Less Cost

The product of years of experience in alloying metals for bearing purposes.

Cut the cost of motor upkeep with

VELOX BRONZE

Armature and Axle Bearings



"C" Grade Nickel Babbitt For Armature Bearings

A. GILBERT & SONS BRASS FOUNDRY CO.

ST. LOUIS, U. S. A.

Kalamazoo
trolley wheels and harps

THE VERY FACT that Kalamazoo Trolley Harps and Wheels are made by the largest concern of its kind in the World is in itself an indication of their standard.

Our products are made in a shop devoted exclusively to these specialties. Today we are supplying the major part of the entire demand of the United States. There must be a reason for this, and there *is*. And that is, a high reputation due to high quality.

Kalamazoo Trolley Harps and Wheels have been endorsed by the leading electric roads since their inception on the market, over 25 years ago.

Kalamazoo Harps give perfect and continuous contact, and are designed to permit easy replacement of wheels. There is only one cotter pin to be taken out to remove the wheel.

They are balanced for easy running and freedom from slippage. They do not wear down and damage the wire, for wire life is more important than wheel life.





Kalamazoo wheels are made of virgin metal—pure lake copper—they are of proper design for the intended service, and are honestly manufactured.





STAR BRASS WORKS
Kalamazoo, Michigan
The largest exclusive manufacturers of trolley wheels in the world

There's A Great Difference!



The Stafford Roller Bearing for Car Trucks is supplied with oil (about 2½ lbs.) and is sealed air-, dust- and oil-tight for a year's service without additional lubrication or inspection. Maintaining the Stafford Roller Bearing is a one man's job, once a year.

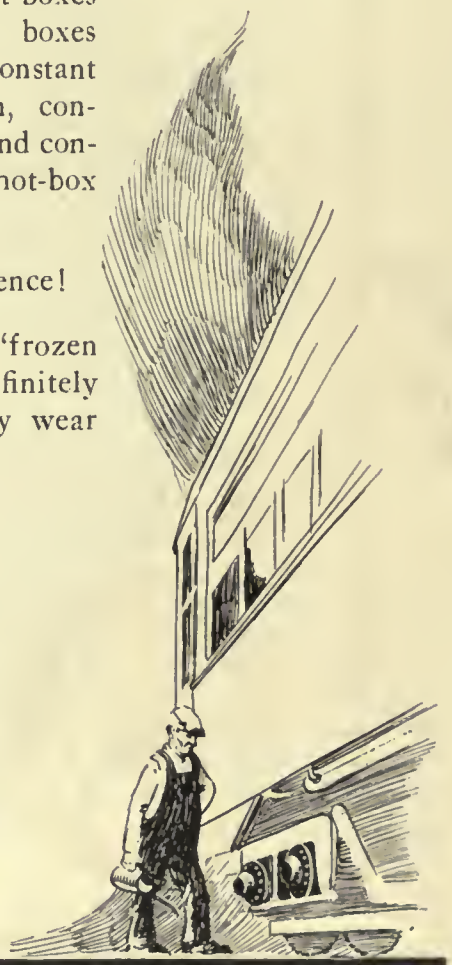
Compare this with the labor and expense in maintaining the antiquated friction bearing—repairs due to hot boxes (there are no hot boxes with the Stafford), constant journal-box inspection, constant lubricating cost, and constant purchases of hot-box materials.

There's a *great* difference!

Guaranteed against "frozen journals" and indefinitely against producing any wear on journals—

Stafford Roller Bearings—guaranteed three years

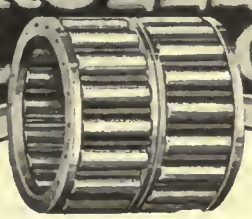




STAFFORD ROLLER BEARING CAR TRUCK CORPORATION

LAWTON MICHIGAN

"IT ROLLS THE FRICTION AWAY"





The Perfect Track

Safety—Economy—Endurance

These three are requisites of true efficiency and can be secured by the use of

Carnegie Steel Cross Ties

As the use of Steel Cross Ties is an essential item toward the attainment of The Perfect Track, so then should they be included as an essential item in your track maintenance program.

Listed below are other products manufactured especially for railway use. They are made to the same high standard of quality that has won for Carnegie Steel Company the reputation it today enjoys.

Wrought Steel Wheels
Wrought Steel Gear Blanks
Standard Forged and Heat Treated Axles
Rails and Splice Bars

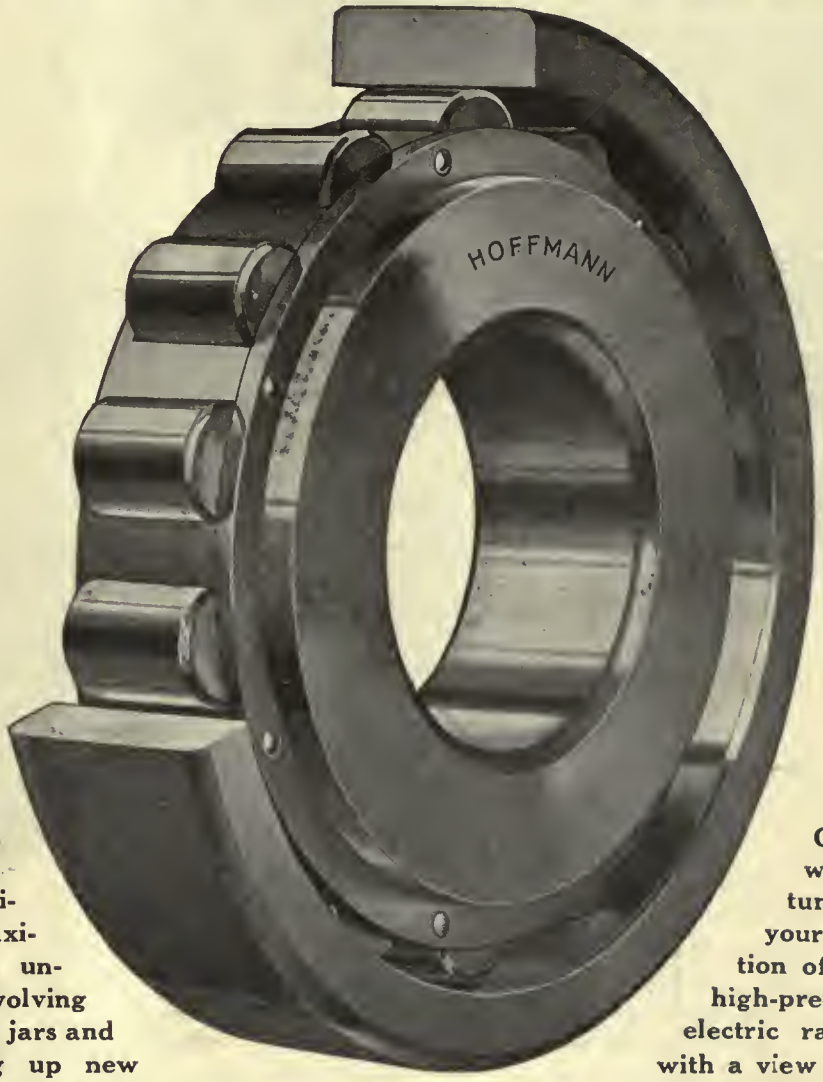
Carnegie Steel Company

GENERAL OFFICES -- CARNEGIE BUILDING -- PITTSBURGH, PA.

1608

HOFFMANN

PRECISION ROLLER BEARINGS



Heavy-duty units built to the highest standards of precision; affording maximum serviceability under conditions involving heavy loads, shocks, jars and vibrations; opening up new avenues to power saving and reduced up-keep costs; built in both standard and self-aligning types.

Our engineers will welcome an opportunity to work with yours, in the application of these high-duty, high-precision bearings to electric railway equipment with a view to securing maximum anti-friction efficiency, minimum maintenance costs, and continuity of service.

THE NORMA COMPANY OF AMERICA

Anable Avenue Long Island City New York

Manufacturers of "NORMA" Precision Ball Bearings



These

The Answer!

After using Miller Trolley Shoes for several years, these well-known roads—

The Knoxville Ry. & Lt. Co.
The Portland-Lewiston Interurban
The Chicago, No. Shore of Milw. R.R.

specifically state that their observations show less wear on the trolley wire and fewer calls for line breaks than when they used trolley wheels. And it's logical, too, because Miller Trolley Shoes make a glossy surface on the wire, over which they slide with less trolley tension and without arcing and burning the wire.



Miller Trolley Shoe

roads report that wire wear is less!

MILLER TROLLEY SHOES

(patented)

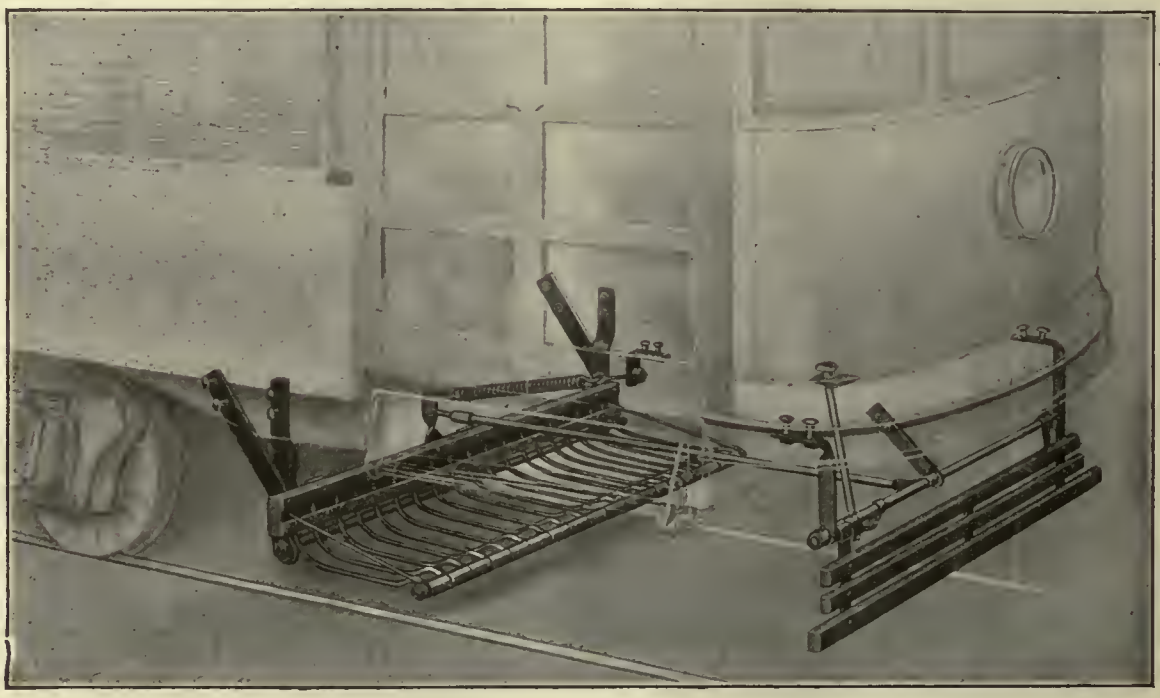
offer many other advantages

1. They are cheaper to maintain. The sliding contact lasts longer and when finally worn out is cheaper to replace than a trolley wheel.
2. No lubrication is required for Miller Trolley Shoes. The nightly oiling of trolley wheels is eliminated.
3. They run quietly, avoiding entirely that annoying rumble made by the trolley wheel running at high speed.
4. Their constant contact—over a 3-inch surface—means better current supply to motors, less resistance, and steady lights at night, instead of flickering ones.
5. They require less tension in the trolley springs—only about two-thirds that required by wheels.
6. They do not jump and tear down wires, but cling to the wire better at high speeds and around curves.

Try them yourself and see the difference

Co.-Boston-21, Mass.





H. B. Life Guards

Our improved metal basket lowers maintenance cost.

We do not have to offer our equipment to roads to experiment with as our long experience in building fending equipment has given US the experience, enabling us to offer this improvement with the knowledge that it will be satisfactory and is another step in bringing up the efficiency of your fending equipment.

All railroad officials are anxious to have the best and most modern equipments with strength and reliability where life is at stake.

SPECIFY AS

CONSOLIDATED CAR

Providence,

General Sales Agents: Wendell



Providence Fenders

for suburban and interurban service

Big, efficient and long lived,—Providence Fenders are the standard equipment of many leading interurban roads. Especially adapted to conditions where cars operate over open track, where H-B Life Guards would not do.

Our thirty years' experience enables us to offer the most efficient and economical equipment of the kind on the market.

MANUFACTURED BY

FENDER COMPANY

Rhode Island

& MacDuffie Co., 61 Broadway, New York



The new COLUMBIA Catalog

Our new catalog is ready for distribution.

We have tried to make this catalog representative of the Columbia Machine Works—to list our products and to render as much help as possible to the purchasers and users of Electric Railway Equipment. We have not included all of our products, but from time to time will send out new pages that we hope you will add to this catalog.

COLUMBIA 18 92 MACHINE WORKS

BROOKLYN N. Y.



IRVING SAFSTEP
TRADE MARK
(PATENTED) REG.U.S.PAT.OFF.
ABSOLUTELY NON-SLIPPING ALWAYS

Whatever the type or character of your car equipment, and whether for city or interurban traffic, **Irving Safsteps** will mean greater safety and comfort for your passengers, and lower step-accident hazard for you.

Absolutely Non-Slipping—under all conditions—wet or dry—even with snow or ice upon them.

Extremely Light Weight, with the utmost of strength and rigidity.

Permanently Non-Slipping—no abrasive insets, no bars or mats to wear out and work loose.

Practically Indestructible, because made of steel members solidly riveted up in a self-contained unit.

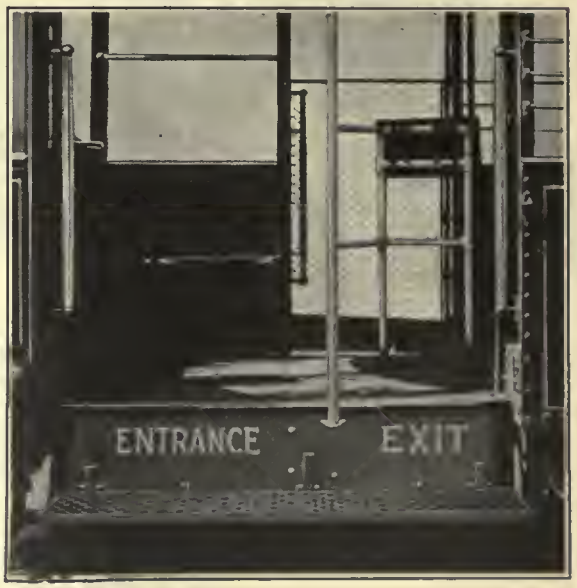
Cleanly, because dirt and dust fall through and are not tracked into the car.

Economical, because time-proof and wear-proof, and adapted to any type or size of car.

Think of the dollars-and-cents value of these Safstep qualities, on your own lines. Then write for Catalog 3A28.

IRVING IRON WORKS CO.
LONG ISLAND CITY, N.Y., U.S.A.





Maintenance costs



V-K

Oilless Trolley Wheels Cost less per mile

Perfect lubrication plus maximum conductivity. That's the combination that makes V-K Oilless Trolley Wheels lowest in ultimate cost and highest in net efficiency.

They insure greatest mileage with least wear and tear on overhead construction. That's because the metal from which they are made is especially tough and not too hard.

The V-K Oilless Trolley Wheel used with the V-K non-arcing harp has proven it will do more to reduce trolley maintenance costs, both wheel replacements and overhead repairs, than any other current collector on the market.

MORE-JONES

ST. LOUIS

can be reduced



"TIGER" BRONZE
AXLE AND ARMATURE BEARINGS

Standardize on "Tiger" bronze bearings for economy's sake. They will save their cost many times over in the course of a year, and then there's an additional revenue derived by keeping the cars in constant service.

The exceptional toughness and anti-frictional qualities of "Tiger" Bronze insures great strength and a very slow and even rate of wear. This results in correct bearing alignment and greater mileage.



M-J
Armature Babbitt

Service—not first cost—is the basis on which M-J Armature Babbitt is sold. More-Jones experts, with more than 40 years of experience to guide them, compounded this exceptional babbitt for the railway field exclusively. It is pure tin, copper, antimony and metallic nickel, alloyed to the highest degree of practical utility—there is not a trace of lead in it. Specify M-J *only* for armature bearing service.

BRASS & METAL CO.
MISSOURI



A Data Book
ST. LOUIS CAR CO. CATALOG

FULL of illustrations—photos, diagrams and floor plans—and replete with facts and figures—dimensions, weights and equipment details. This new St. Louis Catalog will be of real assistance to you in planning your new safety cars.

The new type St. Louis "Universal" double-truck one-man car is thoroughly described. The details you want to know about it are shown.

Write for this booklet today and tell us what your requirements are so that we may figure on them.

Ask for Catalog No. 103
Specialties Bulletin No. 100
Seat Catalog No. 101
Safety Car Truck Bulletin No. 102





St. Louis Car Company
St. Louis, Mo.
"The Birthplace of the Safety Car"

Ft. Wayne Safety Car



"Universal" Double-Truck Safety Car



Detroit Safety Car



Quality is remembered
when price is long
forgotten.
That's why "Tool Steel"
gears and pinions are
increasingly popular.

There are 19 Ry. Cos.
in the U.S. operating more than
1,000 cars each.

Thirteen are regular users
of "Tool Steel" gears and pinions.

$\frac{13}{19} = 68\%$

The Tool Steel Gear & Pinion Co., Cincinnati, Ohio



The Eastern Massachusetts Street Railway Company is using Rolled Wheels, made by the Standard Steel Works Company, who also manufacture Steel Tires, Axles, Steel Springs, Steel Forgings, Steel and Malleable Iron Castings and Steel Pipe Flanges

"Not only to make better products but to make them better understood—not only to sell but to serve, assisting those who buy to choose as well as use their purchases—this is the privilege if not the practice of all modern manufacturers."
—Vauclain

STANDARD STEEL WORKS COMPANY

PHILADELPHIA, PA.

BRANCH OFFICES

CHICAGO
ST. LOUIS
HOUSTON, TEXAS
PORTLAND, ORE.
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BOSTON
ST. PAUL, MINN.
PITTSBURG, PA.
MEXICO CITY, MEX.

WORKS: BURNHAM, PA.

Announcement

THE Missouri Car Company announces the completion of their new Plant, and that they will be ready to start operation on the 1st of April on the production of street railway cars and motor bus bodies. The factory will be equipped with the most modern and latest types of wood and steel-working machinery.

EXECUTIVE OFFICES:
Chemical Building
St. Louis, Mo.

FACTORY:
24th and McCasland Ave.
East St. Louis, Ill.



Thousands of tons of AJAX METAL go into bearings each year



Ajax Check Plates



Ajax Car Brasses

—and no order is too small to receive careful attention, nor too large to be taken care of in a satisfactory manner.

In our shops are thousands of patterns of car bearings, as well as locomotive and other castings,—all available to our customers. AJAX Car Journal Bearings are used on street cars, on the cars of the large trunk lines and in every industrial field.

AJAX Brasses, whether ARA Standard or of other type are made of alloys of correct proportions correctly treated, and exhibit workmanship that is characteristic of all AJAX Castings. AJAX "Perfecto" Check Plates are tough, will bend before they will break, and give longest possible service.

AJAX Armature Babbitt is unsurpassed for adaptability and service.

AJAX Bull Bearing Alloy is unequalled for lining axles, and gives better results than babbitt.

THE AJAX METAL COMPANY

Established 1880

Philadelphia

NEW YORK CHICAGO BOSTON CLEVELAND

Trade  Mark

BEARING METALS and CASTINGS

BALDWIN

Baldwin Electric Motor Trucks on the Prince of Wales Electric Train in Japan



Osaka Electric Railway Train Equipped with Baldwin Trucks—Type "78-25" A. Gauge, 4 ft. 8½ in. Center pin load, 27,500 lb. Wheels, diameter, 36 in. Wheel base, 78 in.

ON the high speed interurban and street railway lines in Japan and the Far East, Baldwin Electric Motor Trucks are an important part of the equipment.

The illustration shows the train used by His Royal Highness, Albert Edward, the Prince of Wales for his tour through Japan last year. It is here shown on the Osaka Railway between Nara and Osaka.

Baldwin Trucks are known throughout the world for their simplicity, their low maintenance, and easy riding qualities. Baldwin representatives in all countries. Detailed information upon request.

THE BALDWIN LOCOMOTIVE WORKS

PHILADELPHIA, U. S. A.

Cable Address, "Baldwin, Philadelphia"

MOTOR TRUCKS

The SAFETY of your Linemen is an Asset!

Equip with

The "Safety" Tools

RIMCO

RUBBER INSULATED PLIERS and SCREW DRIVERS

and Protect Your Men!

The only safe tools for high tension work

Subjected to 10,000 Volts Test and passed by the Electrical Testing Laboratories, N. Y. C.

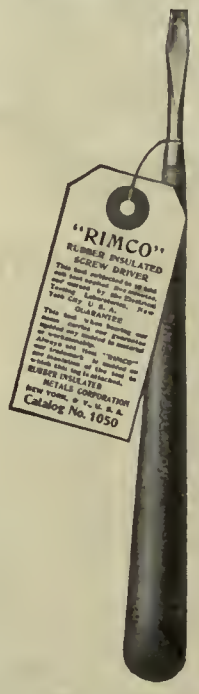


6-in., 7-in., 8-in., 9-in.

Semi-soft rubber handles *bonded* to the metal by our patented "Rimco" method—cannot come off—cannot crack or break if dropped on a hard surface or from the arm of a pole. Finest tool steel. Practically indestructible.



Manufacturers! We rubber insulate (or cover) Switch Handles and other products by our patented "Rimco" method and have same tested to any desired voltage by the Electrical Testiog Laboratories, N. Y. C.



7½-in., 8½-in., 10½-in.

Manufactured solely by the

RUBBER INSULATED METALS CORPORATION

50 Church Street, New York

STANDARD

Copper Wire—High Strength Bronze Wire—Copper Clad Steel Wire

For trolley and transmission service

Meet every service requirement however exacting

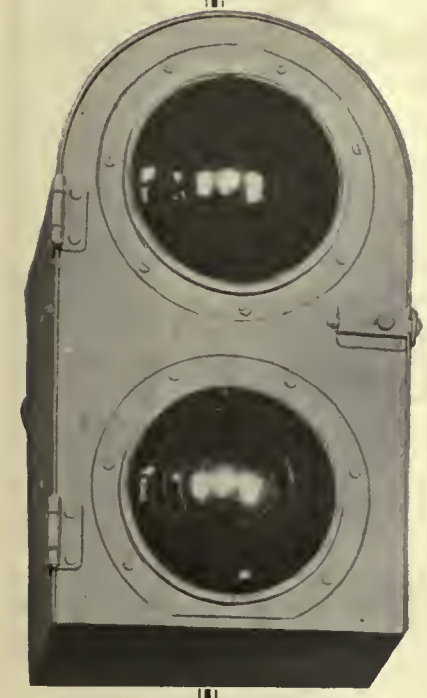
They are rolled and drawn in our own rod and wire mills from the highest grade copper wire bars, and their superior quality is guaranteed by a system of careful inspections and tests at different stages of manufacture. They are further guaranteed by many years of service under all sorts of operating conditions.

We have unexcelled manufacturing and shipping facilities and can meet your requirements, however large, promptly.

Write our nearest office.

STANDARD UNDERGROUND CABLE CO.

BOSTON PHILADELPHIA ATLANTA CHICAGO ST. LOUIS SEATTLE
NEW YORK WASHINGTON PITTSBURGH DETROIT LOS ANGELES
FACTORIES: PERTH AMBOY, N. J.; PITTSBURGH, PA.; ST. LOUIS, MO.; OAKLAND, CALIF.
FOR CANADA: STANDARD UNDERGROUND CABLE CO. OF CANADA, LIMITED, HAMILTON, ONT.



Now you can get

Chapman
Automatic Signals
with colored light indications

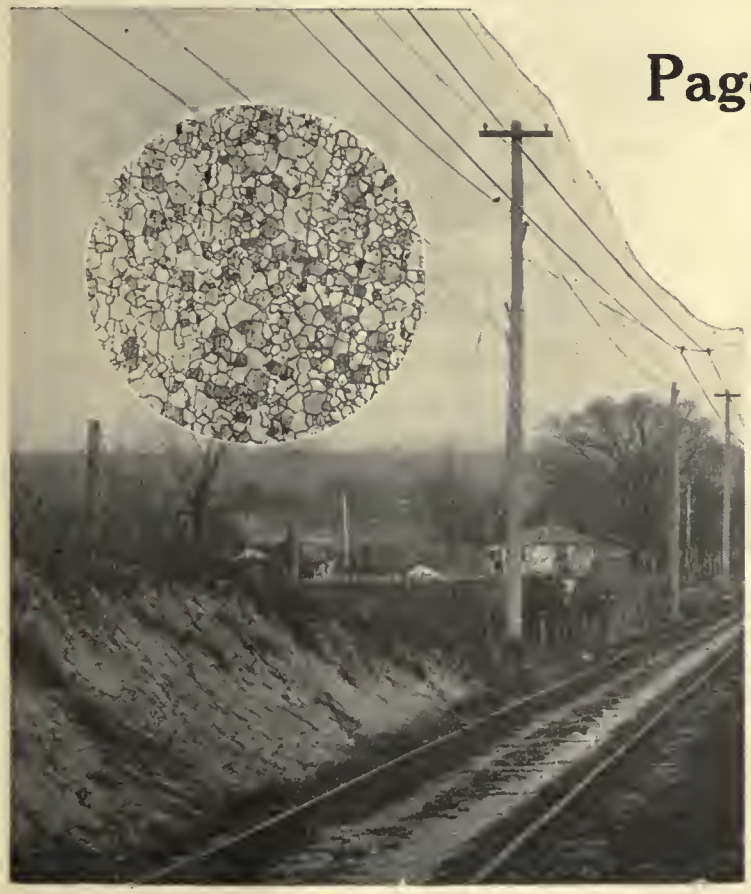
In addition to the popular standard semaphore style, the Chapman Electric Signal Company now offers a new type equipment utilizing red and green light indications.

Retaining all the valuable and reliable principles of the standard Chapman Signal, this new model incorporates several additional and distinctly advantageous features. First, there is a complete separation of the indicating devices from the operating mechanism. The latter is located in a locked box, close to the ground, readily accessible for inspection and adjustment. Second, there is a "counting-in" and "counting-out" feature. Any number of cars can be safely operated through the blocks. Third, when two cars at opposite ends reach the contactors simultaneously, one gets a clear indication and the other a positive "danger" indication.

Let us tell you the other big points



Charles N. Wood Co.
Boston, Mass.



Page-Armco Line Wire

Electrical Properties

Higher conductivity than steel or so called iron wire.

Resists Corrosion

Page-Armco Line Wire is the purest Iron Wire manufactured. Guaranteed 99.84% iron.

It possesses the highest rust resisting qualities of any ferrous wire made.

Where installation is exposed to the corroding fumes of manufacturing districts, railroad terminals, or salt air, it will develop more than double the life of steel wire.

In Insert:

Microphotograph of Page-Armco Wire, showing dense pure metal.

Page Steel and Wire Co.
Bridgeport, Conn.

District Sales Offices:
Chicago New York Pittsburgh
Portland, Ore. San Francisco

PAGE STEEL AND WIRE QUALITY PRODUCTS

ARMCO IGOT IRON



See this

Library Edition of

STEINMETZ

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The nine volumes which Dr. Steinmetz has contributed on the subject of electrical engineering are now available in a handsome specially bound set. To those who know what these great books have meant in the development of electrical engineering theory and practice—this announcement needs no elaboration.

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Have this handsome set with its full treatment of the theory and special problems of electrical engineering at your command. The handbook and the practical treatise may give you the simple fact you need—but Steinmetz gives you the theory and its application—the real solution of the problem.

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Put Dr. Steinmetz's books in your library. They bring you in convenient form the results of his study and experimentation as Chief Consulting Engineer of the General Electric Company. They form a complete presentation of modern electrical engineering theory.

Sent on approval. No money down.
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not only on new construction, but on all replacement work.

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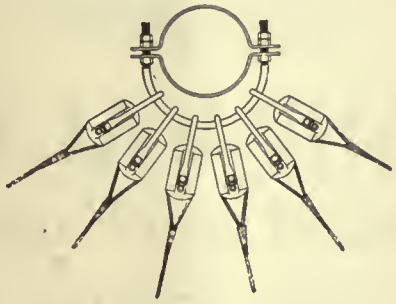
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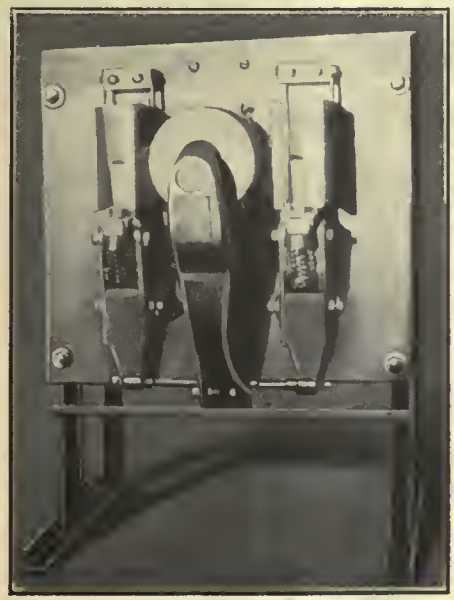
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The present organization offers to manufacturers unprecedented fibre service — a service with three-fold equipment for speedy production, three-fold facilities for quick deliveries and a three-fold reputation.

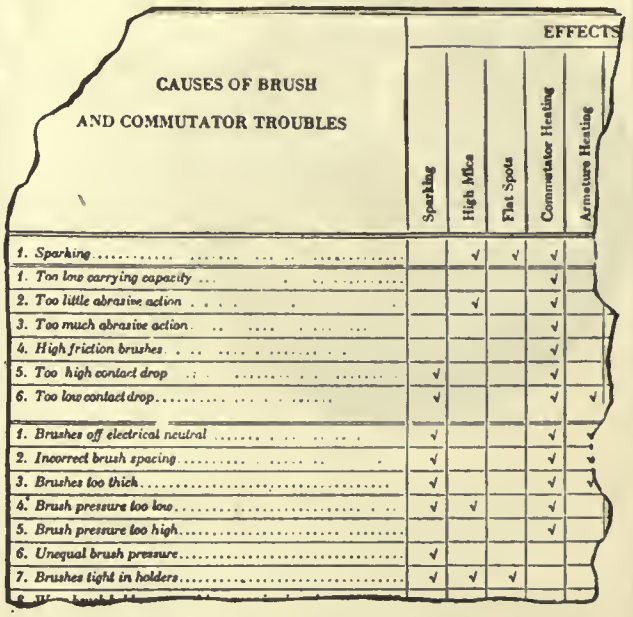
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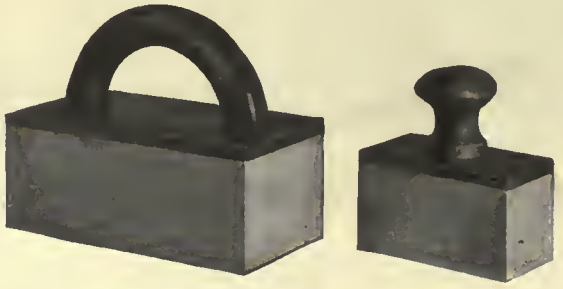


CAUSES OF BRUSH AND COMMUTATOR TROUBLES	EFFECTS: Sparking	High Mica	Flat Spots	Commutator Heating	Armature Heating
1. Sparking		√	√	√	
1. Too low carrying capacity				√	
2. Too little abrasive action		√		√	
3. Too much abrasive action				√	
4. High friction brushes				√	
5. Too high contact drop	√			√	
6. Too low contact drop	√			√	√
1. Brushes off electrical neutral	√			√	
2. Incorrect brush spacing	√			√	
3. Brushes too thick	√			√	
4. Brush pressure too low	√	√		√	
5. Brush pressure too high				√	
6. Unequal brush pressure	√				
7. Brushes tight in holders	√	√	√		

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This 10-in. x 14-in. trouble chart showing all troubles and their causes sent Free on Request.

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Gentlemen:
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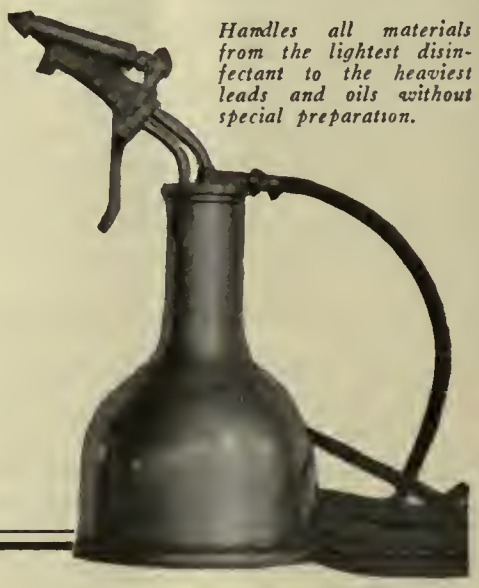
Company .....

Street .....

City and State.....

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Cleaning with the Dayton Air Brush



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An invaluable equipment for every efficient and up-to-date mechanical department and power plant.

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No. 796 Radial M. C. B. Coupler with Double Spring Draft Gear—Vertical Pivoting Head

For City and Interurban Cars



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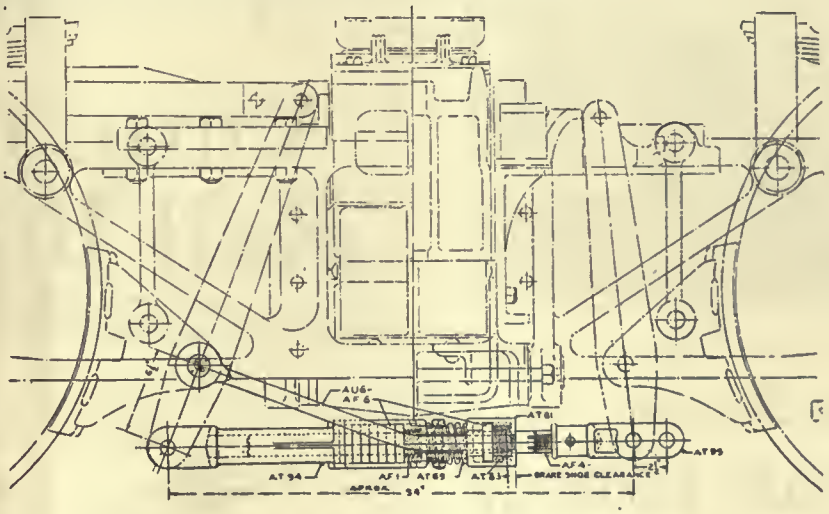
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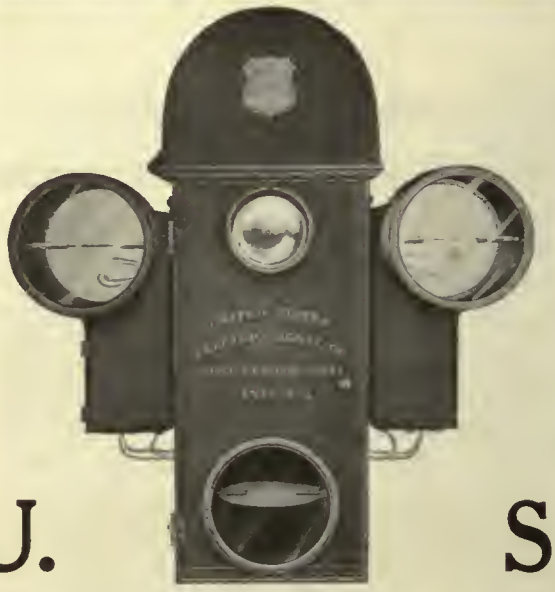
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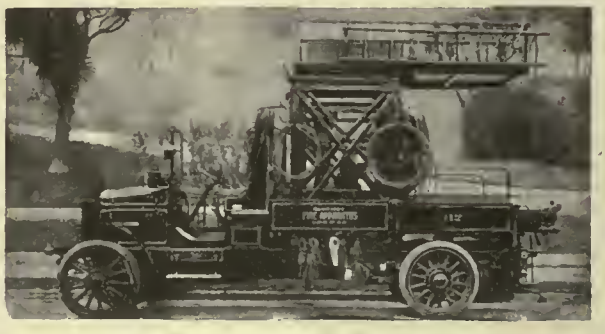
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Prompt shipment from our own stocks.

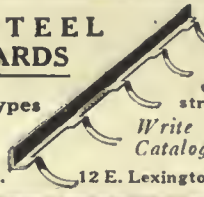
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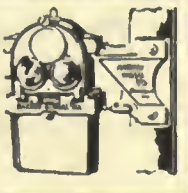
Standard in the Electric Industries for 35 years

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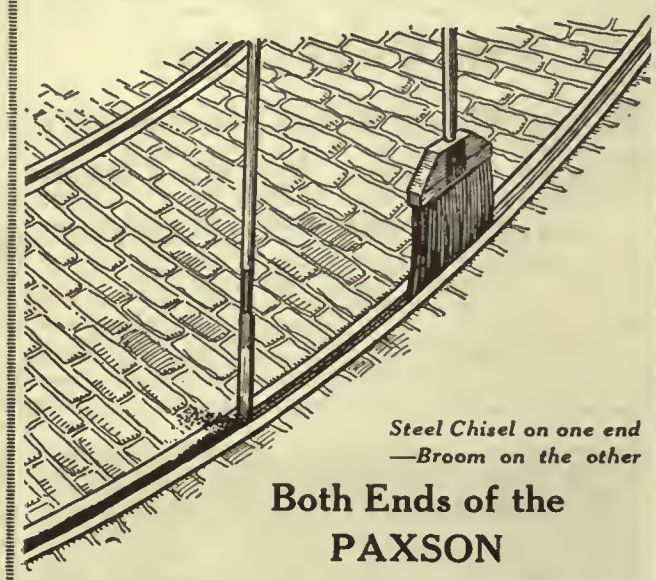
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AUTOMATIC SIGNALS
Highway Crossing Bells
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NACHOD SIGNAL COMPANY, INC.
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GET OUT, DIRT!



Steel Chisel on one end
—Broom on the other

Both Ends of the PAXSON

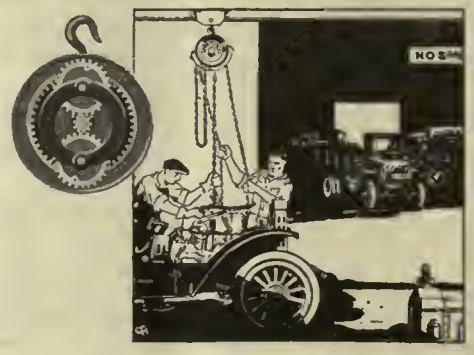
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—for which reason they have been the choice of railway men for 25 years.

Made of fist steel spring wire. Fits frogs, switches and grooves. Has strong ash handle with steel chisel on other end. Broom is light in weight but strong in construction. Send for a sample—you will be pleased.

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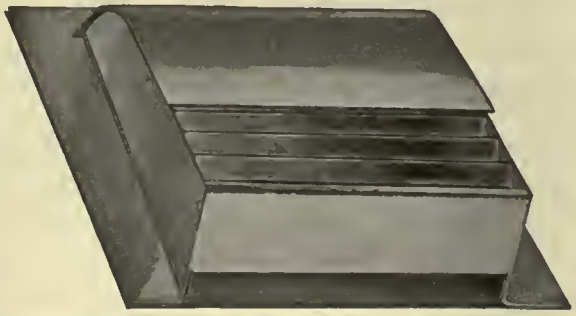
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THE N-L New Style Type C Ventilator is absolutely weatherproof, lays low on roof, looks well and meets every requirement of ventilation.

More than seven thousand N-L Ventilators sold during 1922.

The Nichols-Lintern Company
7960 Lorain Ave., Cleveland, O.

N-L Products manufactured and sold in Canada by
Railway and Power Engineering Corporation, Ltd., 133 Eastern Avenue, Toronto, Ontario

No. 1



EST. 1865 AIMCO INC. 1915
"American" INSULATING MACHINERY COMPANY
REG. U.S. PAT. OFF.
PHILADELPHIA PENNSYLVANIA U.S.A.

"American" Electric Railway Automatic Signals.
RECLAIMING MACHINES } for recovering
INSULATING MACHINES } insulated wire



Advertisements for the
Searchlight Section



Can be received at the New York Office of Electric Railway Journal until 10 a. m.

Wednesday

For issue out Saturday

0220

The Baker
Wood Preserving Company
CREOSOTERS
Washington Court House, Ohio

Cross Ties — Bridge Timbers
Lumber — Posts
Piling

Treated and Untreated

We solicit your inquiries

Creosoting Plant located
Washington Court House, Ohio
On—Penna. R.R., B. & O. R.R., D. T. & I. R.R.

Operating Mills in Southern Ohio

THE WORLD'S STANDARD

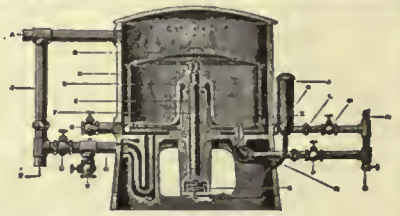
"IRVINGTON"

Black and Yellow
Varnished Silk, Varnished Cambric, Varnished Paper

Irr-O-Slot Insulation Flexible Varnished Tubing
Insulating Varnishes and Compounds

Irvington Varnish & Insulator Co.
Irvington, N. J.
Sales Representatives in the Principal Cities

Don't throw the oily waste away!



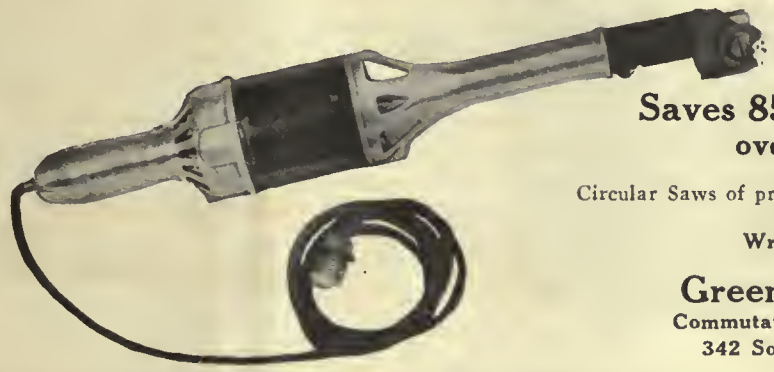
Save Money By Reclaiming It!

This oil extracting machine is reclaiming hundreds of gallons of perfectly good lubricating oil and many pounds of waste for the Milwaukee Electric Railway & Light Co. as well as many other companies. It will do the same for you. It is widely used as a real economy producing equipment.

Write for full details.

OIL & WASTE SAVING MACHINE CO.
Philadelphia, Pa.

AURAND COMMUTATOR SLOTTER



Makes undercutting easy and inexpensive

Saves 85% of Time and Labor
over old hand method

Circular Saws of proper gauge undercut mica to *uniform* depth.

Write us today for catalog

Green Equipment Corp.
Commutator—Stones—Slotters—Cement
342 So. Dearborn St., Chicago, Ill.

THE BABCOCK & WILCOX COMPANY
85 LIBERTY STREET, NEW YORK

Builders since 1868 of Water Tube Boilers of continuing reliability

BRANCH OFFICES

BOSTON, 49 Federal Street
PHILADELPHIA, North American Building
PITTSBURGH, Farmers Deposit Bank Building
CLEVELAND, Guardian Building
CHICAGO, Marquette Building
CINCINNATI, Traction Building
ATLANTA, Candler Building
TUCSON, ARIZ., 21 So. Stone Avenue
DALLAS, TEX., 2001 Magnolia Building
HONOLULU, H. T., Castle & Cooke Building

THE BABCOCK & WILCOX COMPANY — STEAM

WORKS
Bayonne, N. J.
Barberton, Ohio

Makers of Steam Superheaters since 1898 and of Chain Grate Stokers since 1893

BRANCH OFFICES

DETROIT, Ford Building
NEW ORLEANS, 521-5 Baronne Street
HOUSTON, TEXAS, Southern Pacific Building
DENVER, 435 Seventeenth Street
SALT LAKE CITY, 705-6 Kearns Building
SAN FRANCISCO, Sheldon Building
LOS ANGELES, 404-6 Central Building
SEATTLE, L. C. Smith Building
HAVANA, CUBA, Calle de Aguiar 104
SAN JUAN, PORTO RICO, Royal Bank Building

Car Seat and Snow Sweeper *Rattan*

For 60 years we have been the largest importers of rattan from the Far East. It is therefore to be expected that when Rattan is thought of our name, "Heywood-Wakefield," instantly comes to mind.

Follow that impulse and write us when in the market for:

High Grade close woven Rattan Car Seat Webbing, canvas lined and unlined, in widths from 12 in. to 48 in.

High Grade Snow Sweeper Rattan in Natural and Cut Lengths.

High Grade Car Seats, cross or longitudinal, covered with Rattan, Plush or Leather.

HEYWOOD-WAKEFIELD COMPANY

Factory: Wakefield, Mass.

SALES OFFICES:

Heywood-Wakefield Co., 516 West 34th St., New York
Heywood-Wakefield Co., 1415 Michigan Ave., Chicago
E. F. Boyle, Monadnock Bldg., San Francisco, Cal.
F. N. Grigg, 630 Louisiana Ave., Washington, D. C.
Railway and Power Engineering Corp., Toronto and Montreal
G. F. Cotter Supply Co., Houston, Texas

Don't Advertise *Unless*——

you are absolutely on the level with your customers—

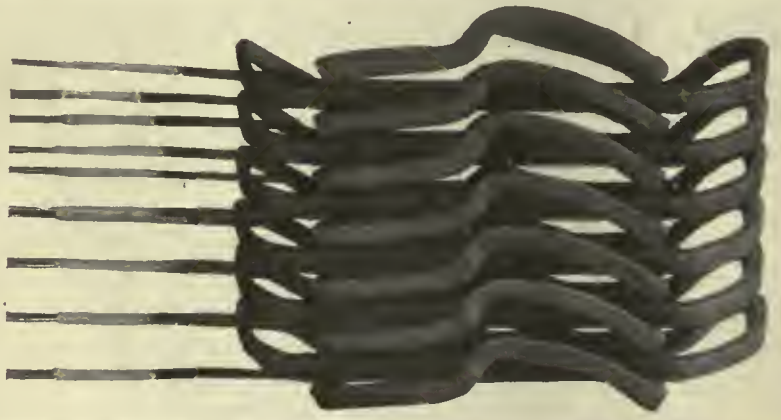
Unless your goods are so excellent that everyone who buys them once will want them again—

Unless there is real need for what you make—

Unless you appreciate that it takes time and costs money to educate an industry to associate your trade mark with a definite standard of quality—

Unless your business is built on the firm foundation of economical production and sound finance.

Published by the Electric Railway Journal in co-operation with The American Association of Advertising Agencies



Motor Overhaul Is Expensive

Your replacement coils should be absolutely dependable.

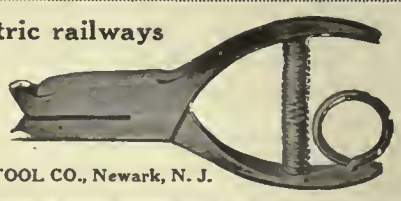
More than thirty years experience in the production of armature and field coils for railway motors has qualified us to give you coils which will stand up in the most severe service. They are made in a shop specializing on this work alone. Every job receives the constant supervision of a manager who has made coils ever since the days of coil-wound armatures.

Let us quote you our prices

Elliott-Thompson Electric Co.
Ajax Building, Cleveland, Ohio

75% of the electric railways use

B-V Punches



Send for Catalog

BONNEY-VEHSLAGE TOOL CO., Newark, N. J.

PS HEATERS

Car Heating and Ventilation

is one of the winter problems that you must settle without delay. We can show you how to take care of both, with one equipment. Now is the time to get your cars ready for next winter. Write for details.

The Peter Smith Heater Company
1725 Mt. Elliott Ave., Detroit, Mich.

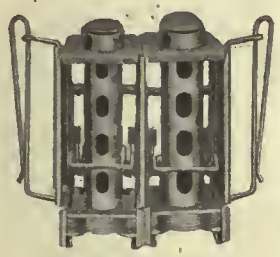
FOSTER SUPERHEATERS

A necessity for turbine protection, engine cylinder economy and utilization of superheat for all its benefits

POWER SPECIALTY COMPANY, 111 BROADWAY, NEW YORK

Boston Philadelphia Pittsburgh Kansas City Dallas Chicago San Francisco London, Eng.

JOHNSON Universal Changer



Adjustable

The best changer on the market. Can be adjusted by the conductor to throw out a varying number of coins, necessary to meet changes in rates of fares.

Flexible

Each barrel a separate unit, permitting the conductor to interchange the barrels to suit his personal requirements, and to facilitate the addition of extra barrels.

JOHNSON FARE BOX COMPANY
Ravenswood, Chicago, Ill.

B. A. Hegeman, Jr., President
Charles C. Castle, First Vice-President — W. C. Lincoln, Manager Sales and Engineering
Harold A. Hegeman, Vice-President, Treas. and Acting Sec'y

National Railway Appliance Co.

Grand Central Terminal, 452 Lexington Ave., Cor. 45th St., New York
BRANCH OFFICES:
Munsey Bldg., Washington, D. C.; 100 Boylston St., Boston, Mass.; Union Trust Bldg., Harrisburg, Pa.; Hegeman-Castle Corporation, Railway Exchange Bldg., Chicago, Ill.

Railway Supplies

Tool Steel Gears and Pinions
Anderson Slack Adjusters
Genesco Paint Oils
Dunham Hopper Door Devices
Anglo-American Varnish Co., Varnishes, Enamels, etc.
Drew Line Material and Railway Specialties
Turnstile Car Corporation
National Hand Holds
Pittsburgh Forge & Iron Co.'s Products
Economy Electric Devices Co., Power Saving Meters
Lind Aluminum Field Coils
C-H Electric Heaters
Garland Ventilators
National Safety Car Equipment Co.'s One-Man Safety Cars
Flaxlinum Insulation
E-Z Car Control Corporation Safety Devices

Tnemec Paint & Oil Co.'s Cement Paint
Fort Pitt Spring & Mfg. Co., Springs

Waterproofed Trolley Cord



Is the finest cord that science and skill can produce. Its wearing qualities are unsurpassed.

FOR POSITIVE SATISFACTION ORDER SILVER LAKE

If you are not familiar with the quality you will be surprised at its ENDURANCE and ECONOMY.

Sold by Net Weights and Full Lengths

SILVER LAKE COMPANY
Manufacturers of bell, signal and other cords.
Newtonville, Massachusetts



THORNTON

The trolley wheel with the high mileage side bearing

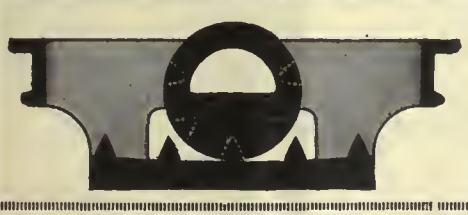
Thornton Wheels with Thornton side bearings are unusually long-lived, require less lubrication, and less maintenance. They are free from vibration and noiseless. No bushings. *Investigate them.*

Bearings make fifty thousand or more miles

Send for descriptive circular

Thornton Trolley Wheel Co.,
Incorporated
Ashland, Kentucky

MAIL THAT ORDER TO NIC



STUCKI SIDE BEARINGS

A. STUCKI CO.
Oliver Bldg.
Pittsburgh, Pa.

"THEY'RE FORGED—NOT CAST
THAT'S WHY THEY LAST"

"CLEVELAND ALL COPPER"

(No Alloy)

TROLLEY WHEELS

The saving more than equals yearly cost of wheels

Send for Particulars

THE COPPER PRODUCTS FORGING CO.
1412 East 47th Street, CLEVELAND

Car Seating, Broom and Snow Sweeper Rattan, Mouldings, etc.

AMERICAN RATTAN & REED MFG. CO.
Brooklyn, N. Y.

AMERICAN means QUALITY
RATTAN SUPPLIES OF EVERY DESCRIPTION

The Most Successful Men in the Electric Railway Industry read the

ELECTRIC RAILWAY JOURNAL

Every Week

55 New Users in the Last 4 Months

KASS SAFETY TREADS

present an Unusual Combination

in that they give BETTER RESULTS AT LESS COST
Manufactured and Sold by

Morton Manufacturing Company, Chicago



Here's the best sales-story yet!!

A certain big company had an electric generator lying around its plant for about two years. During that time letter after letter was sent to its numerous branch offices asking if any of them could use it. Finally the company decided to run a "blind" ad in the Searchlight Section—and a few days later got a wire for the machine from one of its own branch houses.

What direct personal letters did not accomplish in *two years,* "Searchlight" advertising did in *two weeks!* Maybe "Searchlight" appeared at the psychological moment but—

These facts are evident: "Searchlight" is so well known and has such a complete circulation that it can be depended upon to find buyers wherever they may be—even among the owners' branch offices.

For Every Business Want

"Think* SEARCHLIGHT *First"

SEARCHLIGHT SECTION

SEARCHLIGHT SECTION

CRANES and HOISTS

2—10-ton Buffalo 4-wheel Locomotive Cranes, double drum, 35-ft. Boom, with ¾-yd. buckets.

1—10-ton Brownhoist Electric Locomotive Crane, 4-wheel, double drum, 40-ft. boom.

2—Byers Auto Cranes on traction wheels, 30-ft. and 35-ft. booms, ½ and ¾-yd. buckets.

2—Brownhoist Electrically operated Locomotive Cranes, 15-ft. gauge, 75-ft. booms, for Clamshell Bucket operation. Condition equal to new.

6—Clyde Electric Hoists, 75 hp. triple drum with attached swingers, banked levers, etc., (NEW).

6—Haiss 10 x 12 Twin Drum Coal Hoists.

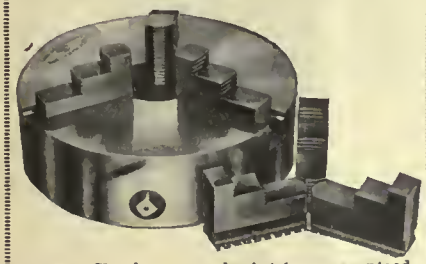
6—Clyde Stiff Leg Derricks, 65-ft. booms, for Clamshell Bucket operation. (NEW).

FORSYTHE BROTHERS
30 Church Street, New York City
Phone: Cortlandt 6272

50% off List

(to the trade)
on T-W Universal Geared scroll 3 jaw (2 sets of jaws)

NEW CHUCKS



These Chucks are absolutely guaranteed against any defect in material, construction or accuracy.

BETTER THAN THE BEST

In all sizes:	*List*
4 inches	$22.00
5 inches	24.00
6 inches	28.00
7½ inches	32.00
9 inches	38.00
10½ inches	44.00
12 inches	52.00

FIFTY (50) PER CENT. OFF LIST

"The House of a Thousand Bargains".

WITBAR TOOL COMPANY
242-244 Lafayette St., New York City.
Phone Canal 6640.

In Stock

5000 New Gears and Pinions All Sizes and Types

TRANSIT EQUIPMENT COMPANY
501 Fifth Avenue, New York.

POSITIONS VACANT

ONE high grade switchboard engineer wanted; also one switchboard builder. American Electric Switch Company, Canton, Ohio.

POSITIONS WANTED

AUDITOR or assistant. Twenty years of experience in electric railway, light and power. At present employed but desire to make change. PW-529, Elec. Ry. Journal, 10th Ave., at 36th St., New York City.

SUPERINTENDENT of equipment, with good record based on broad experience, city and interurban, now employed, desires a change. Willing to rebuild run down property. Interview solicited. PW-525, Electric Railway Journal, 10th Ave. at 36th St., New York.

TWENTY years track department. Familiar all details. Roadmaster or track superintendent. Small city preferred. References or interview. PW-531, Elec. Ry. Journal, 10th Ave. at 36th St., New York City.

SALESMEN WANTED

Salesman

Wanted by a manufacturer of rail bonds and welding apparatus. Man familiar with selling to electric railway field preferred. SW-530, Elec. Ry. Journal, 10th Ave. at 36th St., New York City.

REPRESENTATION AVAILABLE

Ohio Representation

Established manufacturers agent covering Ohio desires account with manufacturer of electric railway equipment. RA-523, Electric Railway Journal, Leader-News Bldg., Cleveland Ohio.

FOR SALE

20—Peter Witt Cars

Weight Complete, 33,000 lbs.

Seat 53. 4—G. E. No. 258-C Motors. K-12-H Control. West. Air Taylor Trucks. R H. Type. Complete.

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa.

FOR SALE

1 Single Truck Car

Remodeled for One-Man Operation

Longitudinal Seats; Golden Oak Finish; Brill 21-E Trucks; 33-in. Wheels; 7-ft. 0-in. Wheel Base; Westinghouse 12A Motors; K-10 Controllers; Folding Doors and Steps, Hand Operated.

Length over bumpers 28-ft. 2-in.
Width 8-ft. 0-in.
Height 11-ft.-0-in.
Weight about 15 Tons.

Excellent condition

Vincennes Electric Railway Co.,
Vincennes, Indiana.

STANDARD—BRAND NEW!

H. S. Side Milling Cutters and Metal Slitting Saws. All sizes; 50% off.
Plain Milling Cutters, 60% off.
H. S. Twist Drills, 75% off Standard List.
Drill Sleeve Sockets—Morse Tapers, 80% off list.

"The House of a Thousand Bargains"
WITBAR TOOL COMPANY
244 Lafayette Street, New York City
Phone: Canal 6640



Where to?—

As this ad goes to press, I'm in Ohio. Last week I was south. Next week,—well, I'll call on you, if you wish. It doesn't matter where you're located; I'll go to you.

Just now, I have for immediate delivery:

1—15 ton cap. Industrial, double drums, 8 wheel MCB, ASME boiler, 40 ft. boom, shop No. 3092, built 1917, excellent condition.

1—20 ton cap. Brownhoist, single drum, 40 ft. boom, ASME boiler, 8 wheel MCB, shop No. 5699, ready for work.

1—10 ton cap. Byers, shop No. 1867, built 1921, double drums, 40 ft. boom, mounted on a 4 wide faced traction wheels almost new.

1—Big Brownhoist Locomotive Crane, 100 ft. boom, double drums, separate engines for each operation, mounted on two 8 wheel trucks, space 27 feet c. to c. Excellent condition throughout, also suitable for use as a dragline outfit.

1—New 75 ton cap. "Ohio," 50 ft. boom, double drums, 8 wheel MCB. Will furnish factory guarantee and erector's services.

1—Nearly New Browning Locomotive Crane, 25 ton capacity, double drums, 60 ft. boom with 1 yd. clam shell.

Philip T.
KING
"The Crane Man"
30 Church St., New York

CHAIN HOISTS

New and Like New
Attractive Prices

3 ton—2 ton—1 ton
½ ton—¼ ton

Screw and Spur Geared
Yale and Towne
Wright Mfg. Co.

Lawrence Machinery Co.
Woolworth Bldg., New York City
Phone: Barclay 2150.

FOR SALE

G. E. CO. ROTARY CONVERTER

60 cycle, 13,200 or 6600 Volt A.C. to 590 Volt D.C., 2200 Kw.



Includes the following:

Item 1—Type HCC, 16 pole, 2200 kw., 450 r.p.m., 590 volt Synchronous Converter with booster and instruments.

Item 2—3 type WC, 60 cycle, 900 kva., 13,200-6600 volt primary, 368 volt secondary, water-cooled Transformers with 10% taps above and below normal and 50% starting tap.

Item 3—Complete 3 panel switchboard for the above.

Built 1917

Has been run only for test—prompt shipment—attractive price

Apply **General Chemical Company, 40 Rector St., New York, N. Y.**



No. 201—2—3—6.
4—45-ft. Interurban Passenger and Baggage Cars—Wood Body, End Entrance, Cane Seat, Monitor Roof Motor G.E. 57, Quadruple, 2-Turn Control Westinghouse, K-14, Single Eqd. Brakes, Westinghouse, Compressors, Nat. Brake & Electric Co. B.B. 2 Baldwin Trucks, 34-in. Wheels, 4½-in. Axles, Each $2,000.00.



No. 207.
Interurban Passenger and Baggage, All Steel Center Eotrance, 51-ft. Car. Motor, Westinghouse, 306 V 4 Quadruple. Control Westinghouse H.L., Brakes, Westinghouse, with Nat. Brake Compressor, B.B.2, Baldwio Trucks, 34-in. Wheels, 5-in. Axles, $4,500.00.

Ten other cars in very good condition are covered by our Bulletin—mailed upon request.

BUFFALO HOUSE WRECKING & SALVAGE CO.

Buffalo, N. Y. Phone, Fillmore 1856

ROTARY CONVERTER

1—300-kw., 25-cy. West. Will sell or trade for 60-cy. Converter of same capacity.

KANKAKEE & URBANA TRACTION CO.
Urbana, Ill.

200-kw. General Electric Belted Railway Generator; 525/575 v., 348 amp., compound wound; Type MP, Class 6-200-425; Form H; 425 r.p.m. In A-1 condition. Complete with generator panel, pulley and rails. Price $740 cash, f.o.b. cars.

ARTHUR S. PARTRIDGE
415 Pine Street, St. Louis, Mo.

H. E. SALZBERG CO., INC.

30 Church St., New York

Always in the market to buy or sell Railway Power Plant Equipment and Supplies.

Let us know your needs

Complete Power Plants Dismantled

—for the Electric Railway Power Plant

THIS is just one of the many opportunities for real savings on the purchase of power plant equipment offered by **Mac Govern.**

Whenever you are in the market for such machinery, it will pay you to consult **Mac Govern** first. Mac Govern & Company, Inc. have for more than 20 years conscientiously served the interests buyers and have earned the place of foremost dealers in the field for all classes of used and surplus new power plant machinery.

We are always ready and pleased to assist you in the matter of buying power equipment for your road and invite your inquiries.

Ask MacGovern for

Turbo Units
A. C. Engine Units—Boilers
D. C. Engine Units—Motors
Motor Generator Sets
Frequency Changers
A. C. and D. C. Generators
Transformers
Rotaries
Compressors—Condensers

Everything for the Power Plant

NEW
Complete Boiler Plant 8230 Hp.

Purchased by MacGovern and now offered for Immediate Delivery

This plant is brand new—never installed. It is the very latest word in design and construction by Sargent & Lundy engineers. Some parts are still in original factory crates.

Prices approximately two-thirds of manufacturer's present quotations.

Complete specifications available.

Plant consists of the following:

10—B. & W. Sterling Boilers each 823 hp. with superheaters and Diamond Soot Blowers.
10—Taylor Underfeed Stokers with accessories.
2—6,000 hp. Feed Water Heaters.
2—Boiler Feed Pumps—Allis-Chalmers, centrifugal type. 200 gals. per minute.
1—Coal Crusher.
3—Coal Conveyors—Bucket, Vertical and Freight.
1—10-ton Traveling Crane.
1—Air Compressor—belt driven. Complete with all fittings. Capacity 600 cu. ft. per min. at 90 lbs.
Circulating Water Piping and Elbows—30 in. and 36 in. cast iron.

Sirocco Fans — Storage Battery
Switchboards — Smokestacks

Quick-Sale Equipment

Opportunities such as this are short-lived. They demand immediate action. What you may wish to order tomorrow might be sold today.

Inquire today and be sure.

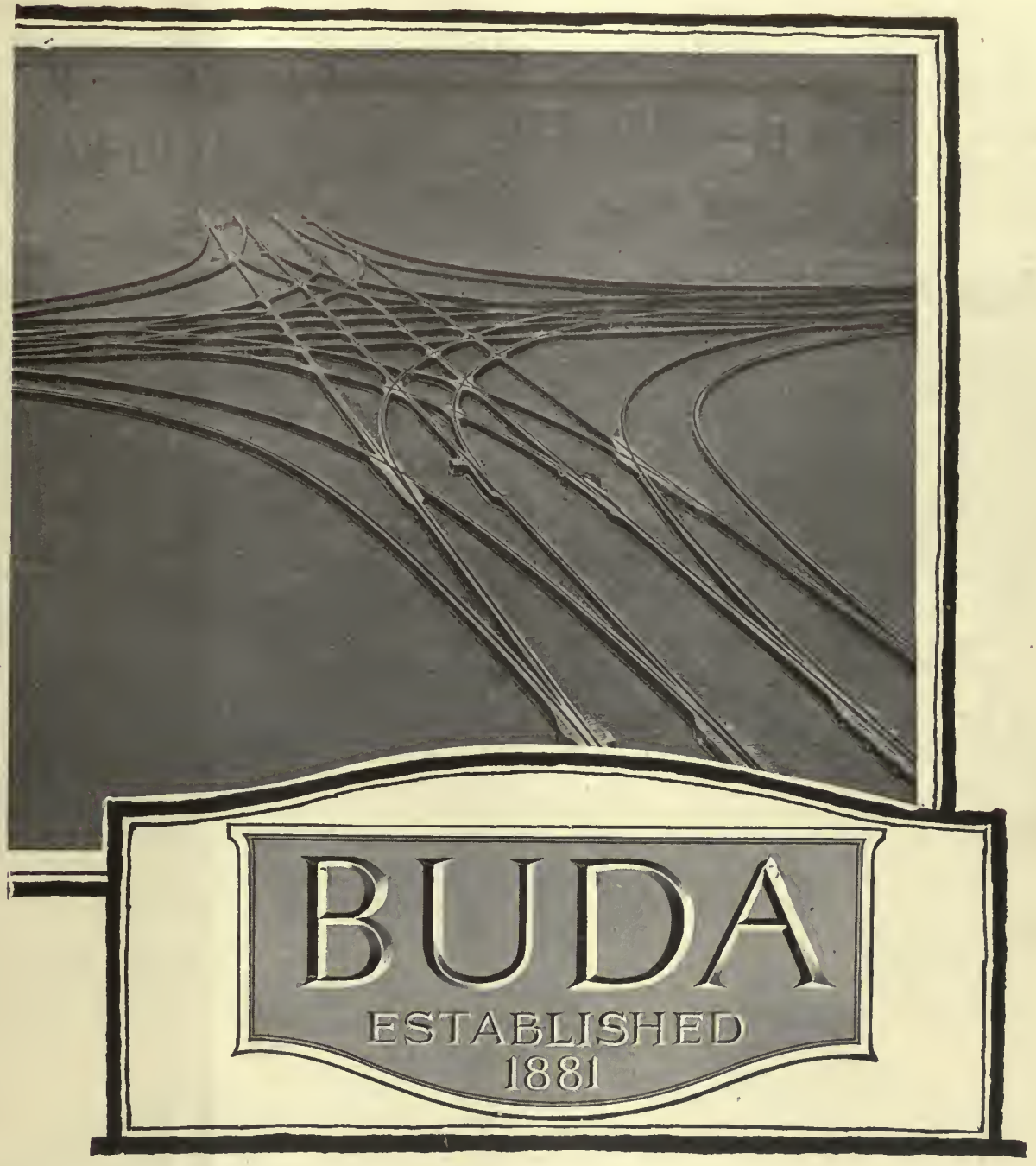
MAC GOVERN POWER MACHINERY & COMPANY INC

114 Liberty Street, New York City
Canadian Office: 285 Beaver Hall Hill, Montreal, Canada

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car
Collier, Inc., Barron G.
Air Circuit Breakers
Roller-Smith Co.
Air Receivers & Aftercoolers
Ingersoll-Rand Co.
Ammeters
Roller-Smith Co.
Anchors, Guy
Elec. Service Supplies Co.
Ohio Brass Co.
Drew Elec. & Mfg. Co.
Western Electric Co.
Westinghouse E. & M. Co.
Armature Shop Tools
Armature Coil Equip. Co.
Elec. Service Supplies Co.
Automatic Return Switch Stands
Ramapo Ajax Corp.
Automatic Safety Switch Stands
Ramapo Ajax Corp.
Axles
Bemis Car Truck Co.
Cambria Steel Co.
Midvale Steel & Ord. Co.
Standard Steel Works Co.
St. Louis Car Co.
Axle Straighteners
Columbia M. W. & M. I. Co.
Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co.
Westinghouse E. & M. Co.
Babbitt Metal
Ajax Metal Co.
More-Jones B. & M. Co.
Babbitting Devices
Columbia M. W. & M. I. Co.
Badges and Buttons
Elec. Service Sup. Co.
Int. Register Co., The
Batteries, Dry
National Carbon Co.
Bearings and Bearing Metals
Ajax Metal Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Drew Elec. & Mfg. Co.
General Electric Co.
Gilbert & Sons B. F. Co., A.
Le Grand, Nic
More-Jones Br. & Metal Co.
St. Louis Car Co.
Westinghouse E. & M. Co.
Beads, Insulating
Martindale Electric Co.
Bearings, Center and Roller Side
Baldwin Locomotive Wks.
Burry Railway Supply Co.
Stucki Co., A.
Bearings, Roller
Stafford Roller Bearing Car Truck Corp.
Bearings, Roller, Ball & Thrust
Norma Co., The
Bells and Gongs
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Consolidated Car Heati'g Co.
Elec. Service Sup. Co.
St. Louis Car Co.
Western Electric Co.
Boilers
Babcock & Wilcox Co.
Edgemoor Iron Co.
Boiler Tubes
Cambria Steel Co.
Edgemoor Iron Co.
Midvale Steel & Ord. Co.
Blowers, Portable, Motor-Driven
Martindale Electric Co.
Bond Testers
Amer. Steel & Wire Co.
Elec. Service Sup. Co.
Bonding Apparatus
Amer. Steel & Wire Co.
Elec. Ry. Improvement Co.
Elec. Service Sup. Co.
Indianapolis Switch & Frog Co.
Ohio Brass Co.
Railway Track-Work Co.
Rail Welding & Bonding Co.
Western Electric Co.
Bonds, Rail
Amer. Steel & Wire Co.
Drew Elec. & Mfg. Co.
Elec. Ry. Improvement Co.
Elec. Service Sup. Co.
General Electric Co.
Indianapolis Switch & Frog Co.
Ohio Brass Co.
Page Steel & Wire Co.
Railway Track Work Co.
Rail Welding & Bonding Co.
Westinghouse E. & M. Co.
Western Electric Co.
Bond Testers
Roller-Smith Co.
Book Publishers
McGraw-Hill Book Co.
Boxes, Switch
Johns-Pratt Co.
Brackets and Cross Arms (See also Poles, Ties, Posts, Etc.)
American Bridge Co.
Bates Exp. Steel Tr. Co.
Drew Elec. & Mfg. Co.
Electric Ry. Equipment Co.
Elec. Service Sup. Co.
Hubbard & Co.
Ohio Brass Co.
Western Electric Co.
Brake Adjusters
Gould Coupler Co.
National Ry. Appliance Co.
Westinghouse Tr. Br. Co.
Brake Shoes
Amer. Br. Shoe & Fdy. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
St. Louis Car Co.
Brakes, Brake Systems and Brake Parts
Ackley Brake & Sup. Corp.
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Safety Car Devices Co.
General Electric Co.
National Brake Co.
St. Louis Car Co.
Safety Car Devices Co.
Westinghouse Tr. Br. Co.
Bridges & Buildings
American Bridge Co.
Brooms, Brushes, Etc.
Worcester Brush & Scraper Co.
Brooms, Track, Steel and Rattan
Amer. Rattan & Reed Mfg. Co.
Paxson Co., J. W.
Brushes, Carbon
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
National Carbon Co.
Westinghouse E. & M. Co.
Brushes, Graphite
National Carbon Co.
Brushes, Wire, Pneumatic
Ingersoll-Rand Co.
Brush Holders
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Bunkers, Coal
American Bridge Co.
Buses, Motor
Brill Co., The J. G.
St. Louis Car Co.
Bus Seats
Hale & Kilburn Corp.
Heywood-Wakefield Co.
Bushings
National Vulcanized Fibre Co.
Bushings, Case Hardened and Manganese
Bemis Car Truck Co.
Brill Co., The J. G.
St. Louis Car Co.
Cables. (See Wires and Cables)
Cambric Tapes, yellow and black varnished
Irvington Varnish & Ins. Co.
Mica Insulator Co.
Carbon Brushes (See Brushes, Carbon)
Car Panel Safety Switches
Westinghouse E. & M. Co.
Cars, Dump
Differential Steel Car Co.
Car Lighting Fixtures
Elec. Service Sup. Co.
Car Panel Safety Switches
Consolidated Car Heati'g Co.
Cars, Passenger, Freight, Express, etc.
Amer. Car Co.
Brill Co., The J. G.
Cambria Steel Co.
Kuhlman Car Co., G. C.
Midvale Steel & Ord. Co.
Missouri Car Co.
McGuire-Cummings Mfg. Co.
National Ry. Appliance Co.
St. Louis Car Co.
Perley A. Thomas
Wason Mfg. Co.
Cars, Gas, Rail
St. Louis Car Co.
Cars, Second Hand
Electric Equipment Co.
Transit Equipment Co.
Cars, Self-Propelled
General Electric Co.
Castings, Brass, Composition or Copper
Ajax Metal Co.
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Drew Elec. & Mfg. Co.
More-Jones Br. & Metal Co.
Castings, Gray Iron and Steel
American Bridge Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
St. Louis Car Co.
Standard Steel Works Co.
Castings, Malleable and Brass
Amer. Br. Shoe & Fdy. Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Le Grand, Nic
St. Louis Car Co.
Catchers and Retrievers, Trolley
Earll, Chas. I.
Eclipse Ry. Supply Co.
Elec. Service Sup. Co.
Ohio Brass Co.
Trolley Supply Co.
Wood Co., Chas. N.
Catenary Construction
Archbold-Brady Co.
Western Electric Co.
Ceiling Car
Pantasote Co., The
Ceilings, Plywood, Panels
Haskelite Mfg. Co.
Circuit-Breakers
General Electric Co.
Roller-Smith Co.
Westinghouse E. & M. Co.
Clamps and Connectors for Wires and Cables
Anderson Mfg. Co., A. & J. M.
Dossert & Co.
Elec. Ry. Equipment Co.
Elec. Service Sup. Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
Cleaners and Scrapers Track (See also Snow-Plows, Sweepers and Brooms)
Brill Co., The J. G.
Root Spring Scraper Co.
St. Louis Car Co.
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General Electric Co.
Coal ad Ash Handling (See Conveying and Hoisting Machinery)
Coil Banding and Winding Machines
Armature Coil Equip. Co.
Columbia M. W. & M. I. Co.
Elec. Service Sup. Co.
Coils, Armature and Field
Columbia M. W. & M. I. Co.
General Electric Co.
Elliott-Thompson Elec. Co.
Rome Wire Co
Westinghouse E. & M. Co.
Coils, Choke and Kicking
Elec. Service Sup. Co.
General Electric Co.
Westinghouse E. & M. Co.
Coin Counting Machines
Intern'l Register Co.
Johnson Fare Box Co.
Commutator Grinders
Martindale Electric Co.
Commutator Slotting Equip. Hand and Motor-Driven
Martindale Electric Co.
Commutator Slotters
Elec. Service Sup. Co.
General Electric Co.
Green Equip. Co.
Martindale Electric Co.
Westinghouse E. & M. Co.
Commutator Stones
Green Equip. Co.
Martindale Electric Co.
Commutator Truing Devices
General Electric Co.
Commutatotrs or Parts
Cameron Elec'l Mfg. Co.
Cleveland Armature Works
Columbia M. W. & M. I. Co.
General Electric Co.
Mica Insulator Co.
Westinghouse E. & M. Co
Compressors, Air
General Electric Co.
Ingersoll-Rand Co.
Western Electric Co.
Westinghouse Tr. Br. Co.
Compressors, Air Portable
Ingersoll-Rand Co.
Concrete Products
Massey Concrete Products Corp.
Concrete Reinforcing Bars
Cambria Steel Co.
Midvale Steel & Ord. Co.
Condensers
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse E. & M. Co.
Condensor Papers
Irvington Varnish & Ins. Co.
Connectors, Solderless
Dossert & Co.
Westinghouse E. & M. Co.
Connectors, Trailer Car
Consolidated Car Heating Co.
Elec. Service Sup. Co.
Ohio Brass Co.
Controllers or Parts
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse E. & M. Co.
Controller Regulators
Elec. Service Sup. Co.
Controlling Systems
General Electric Co.
Westinghouse E. & M. Co.
Converters, Rotary
Allis-Chalmers Mfg. Co.
General Electric Co.
Westinghouse E. & M. Co.
Conveying and Hoisting Machinery
American Bridge Co.
Columbia M. W. & M. I. Co.
Cooling Systems
Spray Engineering Co.
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Anaconda Copper Mining Co.
Cord Adjusters
National Vulcanized Fibre Co.
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Brill Co., The J. G.
Elec. Service Sup. Co.
Internat'l Register Co., The
Roebling's Sons Co., John A.
St. Louis Car Co.
Samson Cordage Works
Silver Lake Co.
Cord Connectors and Couplers
Elec. Service Sup. Co.
Samson Cordage Works
Wood Co., Chas. N.
Cord, Trolley
Trolley Supply Co.
Couplers, Car
Brill Co., The J. G.
Gould Coupler Co.
Ohio Brass Co.
St. Louis Car Co.
Van Dorn Coupler Co.
Westinghouse Tr. Br. Co.
Cranes
Allis-Chalmers Mfg. Co.
Cross Arms (See Brackets)
Crossing Foundations
International Steel Tie Co.
Crossings
Ramapo Ajax Corp.
Crossing Signals (See Signals, Crossing)
Crossing, Frog & Switch
Wharton, Jr., & Co., Wm.
Ramapo Ajax Corp.
Crossing Manganese
Indianapolis Switch & Frog Co.
Ramapo Ajax Corp.
Crossings, Track (See Track, Special Work)
Crossings, Trolley
Ohio Brass Co.
Culverts
Newport Culvert Co.
Culverts, Pipe Concrete
Massey Concrete Products Corp.
Curtains and Curtain Fixtures
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Edwards Co., Inc.,The O.M.
Elec. Service Sup. Co.
Morton Mfg. Co.
Pantasote Co., The
St. Louis Car Co.
Cut-Outs
Johns-Pratt Co.
Dealer's Machinery
Elec. Equipment Co.
Foster Co., H. M.
Derailing Devices (See also Track Work)
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Derailing Switches, Tee Rail
Ramapo Ajax Corp.
Detective Service
Wish-Service, P. Edward
Doors & Door Fixtures
Edwards Co., Inc.,The O. M.
Hale & Kilburn Corp.
St. Louis Car Co.
Doors and Shutters (Steel Rolling)
Kinnear Mfg. Co.
Door Operating Devices
Brill Co., The J. G.
Consolidated Car Heati'g Co.
General Electric Co.
Nat'l Pneumatic Co., Inc.
Safety Car Devices Co.
Doors, Folding Vestibule
Nat'l Pneumatic Co., Ins.
Drills, Rock
Ingersoll-Rand Co.
Drills, Track
Amer. Steel & Wire Co.
Elec. Service Sup. Co.
Ingersoll-Rand Co.
Ohio Brass Co.
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Elec. Service Sup. Co.
Ears
Ohio Brass Co.
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Amer. Electrical Works
Roebling's Sons & Co., J. A.
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Railway Track-Work Co.
Seymour Rail Grinder Co.
Electric Locomotives
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Railway Track-Work Co.
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Railway Track-Work Co.
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Arnold Co., The
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Bibbins, J. Rowland
Day & Zimmerman, Inc.
Drum & Co., A. L.
Ford, Bacon & Davis
Hemphill & Wells
Holst, Engelhardt W.
Jackson, Walter
Ong, Joe R.
Richey, Albert S.
Robinson & Co., Dwight P.
Sanderson & Porter
Smith & Co., C. E.
Stone & Webster
White Eng. Corp., The J. G.
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Ingersoll-Rand Co.
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Johnson Fare Box Co.
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Elec. Service Sup. Co.
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Root Spring Scraper Co.
St. Louis Car Co.
Star Brass Works
Trolley Supply Co.

Files, Commutator Slotting
Martindale Electric Co.

Fibre and Fibre Tubing
Westinghouse E. & M. Co.

Field Coils (See Coils)

Fire Doors and Shutters
Kinnear Mfg. Co.

Flangeway Guards, Steel
Godwin Co., Inc., W. S.

Flaxlinum Insulation
Nat'l Ry. Appliance Co.

Floodlights
Elec. Service Sup. Co.

Flooring, Grating
Irving Iron Works

Folding Doors, Wood, Steel
Kinnear Mfg. Co.

Forgings
Cambria Steel Co.
Carnegie Steel Co.
Columbia M. W. & M. I. Co.
Duff Mfg. Co.
Midvale Steel & Ord. Co.
Standard Steel Works Co.

Frogs & Crossings, Tee Rail
Ramapo Ajax Corp.

Frogs, Track (See Track Work)

Frogs, Trolley
Ohio Brass Co.

Funnel Castings
Wharton, Jr., Inc., & Co., Wm.

Furniture, Metal Office
Edwards Co., Inc.,The O.M.

Fuses, Cartridge, Non-Refillable
Johns-Pratt Co.

Fuses and Fuse Boxes
Columbia M. W. & M. I. Co.
Consolidated Car Heati'g Co.
General Electric Co.
Western Electric Co.
Westinghouse E. & M. Co.

Fuses, Cartridge, Refillable
Johns-Pratt Co.

Fuses, High Voltage
Johns-Pratt Co.

Fuses, Refillable
Columbia M. W. & M. I. Co.
General Electric Co.

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Power Specialty Co.
Westinghouse Tr. Br. Co.

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General Electric Co.

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Westinghouse E. & M. Co.

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Brill Co., The J. G.
St. Louis Car Co.

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Nuttall Co., R. D.
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Westinghouse E. & M. Co.

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Indianapolis Switch & Frog Co.

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Railway Track-work Co.

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Railway Track-Work Co.

Grinders, Portable Electric
Railway Track-Work Co.
Seymour Rail Grinder Co.

Grinding Blocks and Wheels
Railway Track-work Co.

Ground Wires
Page Steel & Wire Co.

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Ramapo Ajax Corp.

Guard Rails, Tee Rail & Manganese
Ramapo Ajax Corp.

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American Bridge Co.

Guards, Trolley
Elec. Service Sup. Co.
Ohio Brass Co.

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Ingersoll-Rand Co.

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Bayonet Trolley Harp Co.
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More-Jones Br. & Metal Co.
Nuttall Co., R. D.
Star Brass Works
Thornton Trolley Wheel Co.
Western Electric Co.

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Elec. Service Sup. Co.
General Electric Co.
Ohio Brass Co.
St. Louis Car Co.
Trolley Supply Co.

Headlining
Haskelite Mfg. Co.
Pantasote Co., The

Heaters, Car (Electric)
Consolidated Car Heati'g Co.
Economy Elec. Devices Co.
Gold Car Heat. & Light. Co.
Nat'l Ry. Appliance Co., P.
Smith Heater Co., Peter

Helmets—Welding
Indianapolis Switch & Frog Co.
Railway Track-Work Co.

Heaters, Car, Hot Air and Water
Elec. Service Sup. Co.
Smith Heater Co., Peter

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Columbia M. W. & M. I. Co.
Ford Chain Block Co.

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Ingersoll-Rand Co.

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Massey Concrete Products Corp.

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Allis-Chalmers Mfg. Co.

Industrial Co-ordination
Sherman Service, Inc.

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Elec. Service Sup. Co.
General Electric Co.
Roller-Smith Co.
Western Electric Co.
Westinghouse E. & M. Co.

Insulating Cloth, Paper and Tape
Anchor-Webbing Co.
General Electric Co.
Irvington Varnish & Ins. Co.
Mica Insulator Co.
National Vulcanized Fibre Co.
Stand. Underground Cable Co.
Westinghouse E. & M. Co.

Insulating Silk
Irvington Varnish & Ins. Co.

Insulating Varnishes
Irvington Varnish & Ins. Co.

Insulation (See also Paints)
Anderson, M. Co., A. & J. M.
Electric Ry. Equiptmt. Co.
Electric Service Sup. Co.
General Electric Co.
Irvington Varnish & Ins. Co.
Mica Insulator Co.
Westinghouse E. & M. Co.

Insulators (see also Line Material)
Anderson, M. Co., A. & J. M.
Drew Elec. & Mfg. Co.
Electric Ry. Equipmt. Co.
Electric Service Sup. Co.
General Electric Co.
Hemingray Glass Co.
Irvington Varnish & Ins. Co.
Ohio Brass Co.
Western Electric Co.
Westinghouse E. & M. Co.

Insulators, Combination Strain
American Porcelain Co.

Insulator Pins
Drew Elec. & Mfg. Co.
Elec. Service Sup. Co.
Hubbard & Co.

Insulators, High Voltage
Lapp Insulator Co., Inc.

Insurance, Fire
Marsh & McLennan

Jacks (See also Cranes, Hoists and Lifts)
Buckeye Jack Mfg. Co.
Buda Co.
Duff Mfg. Co.
Elec. Service Sup. Co.

Joints, Rail
(See Rail Joints)

Journal Boxes
Bemis Car Truck Co.
Brill Co., J. G.
St. Louis Car Co.

Junction Boxes
Std. Underground Cable Co.

Lamps, Guards and Fixtures
Anderson M. Co., A. & J. M.
Elec. Service Sup. Co.
General Electric Co.
Westinghouse E. & M. Co.

Lamps, Arc & Incandescent
(See also Headlights)
Anderson, M. Co., A. & J. M.
General Electric Co.
Westinghouse E. & M. Co.

Lamps, Signal and Marker
Nichols-Lintern Co.

Lanterns, Classification
Nichols-Lintern Co.

Lightning Protection
Anderson, M. Co., A. & J. M.
Elec. Service Sup. Co.
General Electric Co.
Ohio Brass Co.
Shaw, Henry M.
Westinghouse E. & M. Co.

Line Material (See also Brackets, Insulators, Wires, etc.)
Anderson, M. Co., A. &, J. M.
Archbold-Brady Co.
Columbia M. W. & M. I. Co.
Dossert & Co.
Drew Elec. & Mfg. Co.
Electric Ry. Equipmt. Co.
Elec. Service Sup. Co.
Hubbard & Co.
More-Jones Br. & Metal Co.
Ohio Brass Co.
Western Electric Co.
Westinghouse E. & M. Co.

Lockers, Metal
Edwards Co., Inc.,The O. M.

Locking Spring Boxes
Wharton Jr., & Co., Wm.

Locomotives, Electric
Baldwin Locomotive Wks.
General Electric Co.
McGuire-Cummings Mfg. Co.
Westinghouse E. & M. Co.

Lubricating Engineers
Galena Signal Oil Co.
Universal Lubricating Co.
Vacuum Oil Co.

Lubricants, Oil and Grease
Galena Signal Co.
Universal Lubricating Co.
Vacuum Oil Co.

Machine Tools
Columbia M. W. & M. I. Co.

Machine Work
Columbia M. W. & M. I. Co.

Machinery, Insulating
Amer. Insulating Mach. Co.

Manganese Steel Castings
Wharton, Jr., & Co., Wm.

Manganese Steel Guard Rails
Ramapo Ajax Corp.

Manganese Steel Switches Frogs & Crossings
Ramapo Ajax Corp.

Manganese Steel Special Track Work
Wharton, Jr., & Co., Wm.

Manganese Track-work
Indianapolis Switch & Frog Co.

Meter Car, Watt Hour
Economy Elec. Devices Co.

Meters (See Instruments)
Elec. Service Sup. Co.
Roller-Smith Co.

Mica
Mica Insulator Co.

Molding, Metal
Allis-Chalmers Mfg. Co.

Motor Buses (See Buses, Motor)

Motorman's Safety Mirrors
Drew Elec. & Mfg. Co.

Motor Leads
Dossert & Co.

Motormen's Seats
Allis-Chalmers Mfg. Co.
Brill Co., J. G.
Elec. Service Sup. Co.
Wood Co., Chas. N.

Motormen's Seats
Heywood-Wakefield Co.
St. Louis Car Co.

Motors, Electric
Westinghouse E. & M. Co.

Motors and Generators, Sets
General Electric Co.

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Cambria Steel Co.
Midvale Steel & Ord. Co.

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Read-Wyl-U-Ryd Co.

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Barbour-Stockwell Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Hubbard & Co.

Ohmmeters
Roller-Smith Co.

Oil Purifiers
DeLaval Separator Co.

Oils (See Lubricants),

Omnibuses (See Buses, Motor)

Oxy-Acetylene (See Cutting Apparatus Oxy-Acetylene)

Packing
Power Specialty Co.

Paint Guns
Dayton Air Brush Co.
Spray Engineering Co.

Paints and Varnishes (Insulating)
Ackley Brake & Supply Corp.
Mica Insulator Co.

Paints & Varnishes, Preservative
Beckwith-Chandler Co.

Paints and Varnishes for Woodwork
Beckwith-Chandler Co.
Glidden Co.
National Ry. Appliance Co.

Paint Spraying Devices
Dayton Air Brush Co.
Spray Engineering Co.

Pavement Breakers
Ingersoll-Rand Co.

Paving Guards, Steel
Godwin Co., Inc., W. S.

Paving Material
Amer. Br. Shoe & Fdy. Co.

Pickups, Trolley Wire
Drew Elec. & Mfg. Co.
Elec. Service Sup Co.
Ohio Brass Co.

Pinion Pullers
Columbia M. W. & M. I. Co.
Drew Elec. & Mfg. Co.
Elec. Service Sup. Co.
General Electric Co.
Wood Co., Chas. N.

Pinions (See Gears)

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Elec. Service Sup. Co.
Ohio Brass Co.
Westinghouse Tr. Brake Co.

Pipe Fittings
Power Specialty Co.
Standard Steel Works Co.
Westinghouse Tr. Brake Co.

Planers (See Machine Tools)

Plates for Tee Rail Switches
Ramapo Ajax Corp.

Pliers, Rubber Insulated
Elec. Service Sup. Co.
Rubber Insulated Metals Corp.

Pneumatic Tools
Ingersoll-Rand Co.

Pole Line Hardware
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Ohio Brass Co.

Poles, Metal Street
Bates Exp. Steel Truss Co.
Elec. Ry. Equipmt. Co.
Hubbard & Co.
Western Electric Co.

Pole Sleeves
Drew Elec. & Mfg. Co.

Poles, Posts & Pilings, Concrete
Massey Concrete Products Corp.

Pole Reinforcing
Drew Elect. & Mfg. Co.
Hubbard & Co.

Poles & Ties Treated
Baker Wood Preserving Co.
International Creosoting & Construction Co
Page & Hill Co.

Poles, Ties, Posts, Piling & Lumber
Baker Wood Preserving Co.
Bell Lumber Co.
International Creosoting & Construction Co.
Le Grand, Inc., Nic
Long Bell Lumber Co.
Nashville Tie Co.
Page & Hill Co.
Southern Cypress Mfrs. Asso.

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Anderson Mfg. Co., A. & J. M.
Bayonet Trolley Harp Co.
Bell Lumber Co.
Columbia M. W. & M. I. Co.
Elec. Service Supplies Co.
Long Bell Lumber Co.
Nuttall Co., R. D.

Poles, Tubular Steel
Elec. Ry. Equipmt. Co.
Elec. Service Sup. Co.

Porcelain, Special High Voltage
Lapp Insulator Co., Inc.

Portable Grinders
Buda Co.

Power Saving Devices
Economy Elec. Devices Co.
National Ry. Appliance Co.

Presses, Transfer
Meisel Press Mfg. Co.

Pressure Regulators
General Electric Co.
Westinghouse E. & M. Co.

Production Engineering
Sherman Service, Inc.

Pumps
Allis-Chalmers Mfg. Co.
Ingersoll-Rand Co.

Pumps, Vacuum
Ingersoll-Rand Co.

Punches, Ticket
Bonney-Vehslage Tool Co.
Intern'l Register Co., The
Wood Co., Chas. N.

Rail Braces & Fastenings
Ramapo Ajax Corp.

Rail Grinders (See Grinders)

Rail Joints
Carnegie Steel Co.

Rail Joints—Welded
Indianapolis Switch & Frog Co.
Lorain Steel Co.

Rails, Steel
Cambria Steel Co.
Carnegie Steel Co.
Midvale Steel & Ord. Co.

Railway Paving Guards, Steel
Godwin Co., Inc., W. S.

Railway Safety Switches
Consolidated Car Heat. Co.
Westinghouse E. & M. Co.

Rail Welding
Alumino-Thermic Corp.
Metal & Thermit Corp.
Railway Track-Work Co.
Rail Welding & Bonding Co.

Rattan
Amer. Rattan & Reed Mfg. Co.
Brill Co., The J. G.
Elec. Service Sup. Co.
Hale & Kilburn Corp.
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McGuire-Cummings Mfg. Co.
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Elec. Service Sup. Co.
Intern'l Register Co., The
Ohmer Fare Register Co.
Rooke Automatic Rg. Co.
St. Louis Car Co.

Reinforcement, Concrete
Amer. Steel & Wire Co.
Carnegie Steel Co.

Repair Shop Appliances (See also Coil Banding and Winding Machines)
Columbia M. W. & M. I. Co.
Elec. Service Sup. Co.

Repair Work (See also Coils)
Columbia M. W. & M. I. Co.
General Electric Co.
Westinghouse E. & M. Co.

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Fare Collection *Safeguarded* and *Standardized!*

The United Electric Railways Company operates in the second most populous section of New England (Providence and vicinity), serves and connects up a half dozen small cities. It operates hundreds of one-man cars, hundreds of pay-enter, pay-leave cars, ordinary box cars, open running-board cars in summer, busy interurban and interstate zone collecting lines—operates an increasing fleet of motor buses serving suburban and cross-town lines, cares for street collections during rush hours, etc., etc.—*all fare collections from this varied operation being cared for by the ROOKE register.*

This standardization is unique as regards its extent and financial effectiveness. Instead of two or three different kinds of boxes and overhead registers with a few punch cards, cash receipt schemes or turnstile devices, this company *meets all its fare-collecting contingencies by making proper use of but one mechanism.* The new model ROOKE Automatic Register receives nickels, dimes, quarters and metal tickets into its *one* coin slot for *instantaneous* registration and accurate classification on different totalizing counters.

On the bus lines, this means that the 15, 25 and 30-cent cash fares are paid by inserting any combination of those coins into the one-slot of the register. In the city operation metal tickets are covering a reduced fare rate and are paid into the register and accurately classified apart from the higher cash fare charge.

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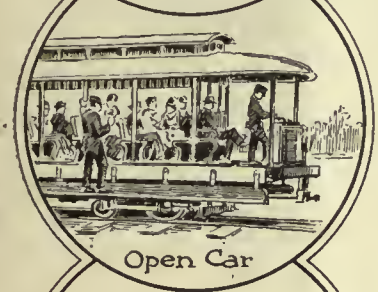
No other large company in this country, operating such a varied service enjoys the degree of *passenger co-operation* which is obtained here. Passengers *always register their own fares* no matter when fare is paid or on what type of car or motor bus it is paid. They become *habituated* to this method of payment and the method of payment insures instantaneous registration and accurate accounting.

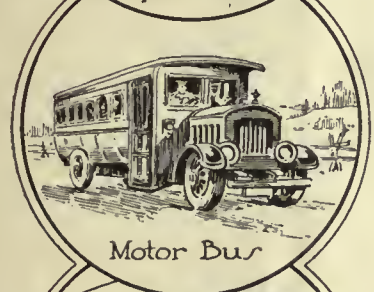
It is the *new capacity ROOKE that makes all this possible.* The old one-coin ROOKE is a memory. The new machine "grips" the nickel-dime-quarter and metal ticket and "tugs" the coin into one ample slot mouth—then *swallows, registers, rings* and *disgorges instantaneously.* No other method or mechanism permits of such standardization or delivers such tight financial results.

Rooke Automatic Register Company
Providence, R. I.







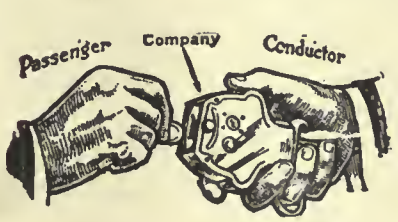


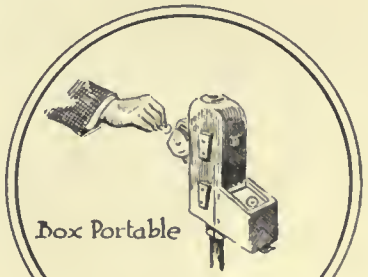




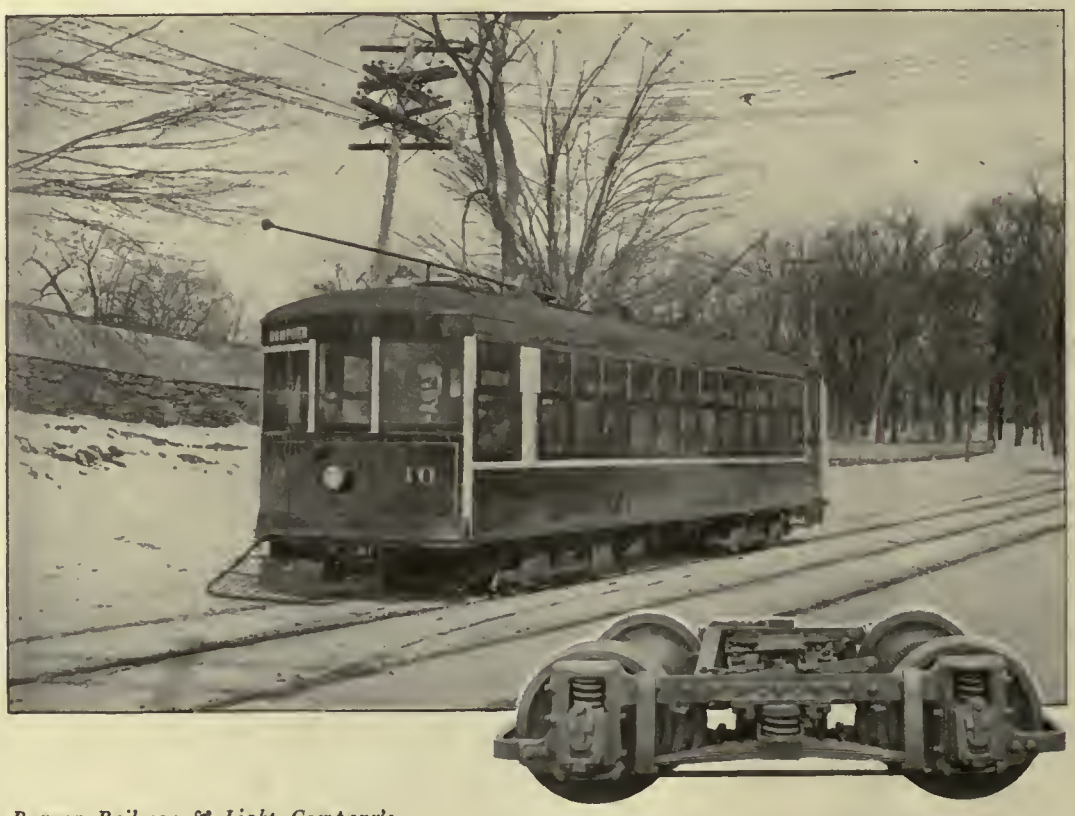












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Comfortable Riding and Low Maintenance are Chief Characteristics of Brill No. 77-E Low-Level Truck for Light-Weight Cars

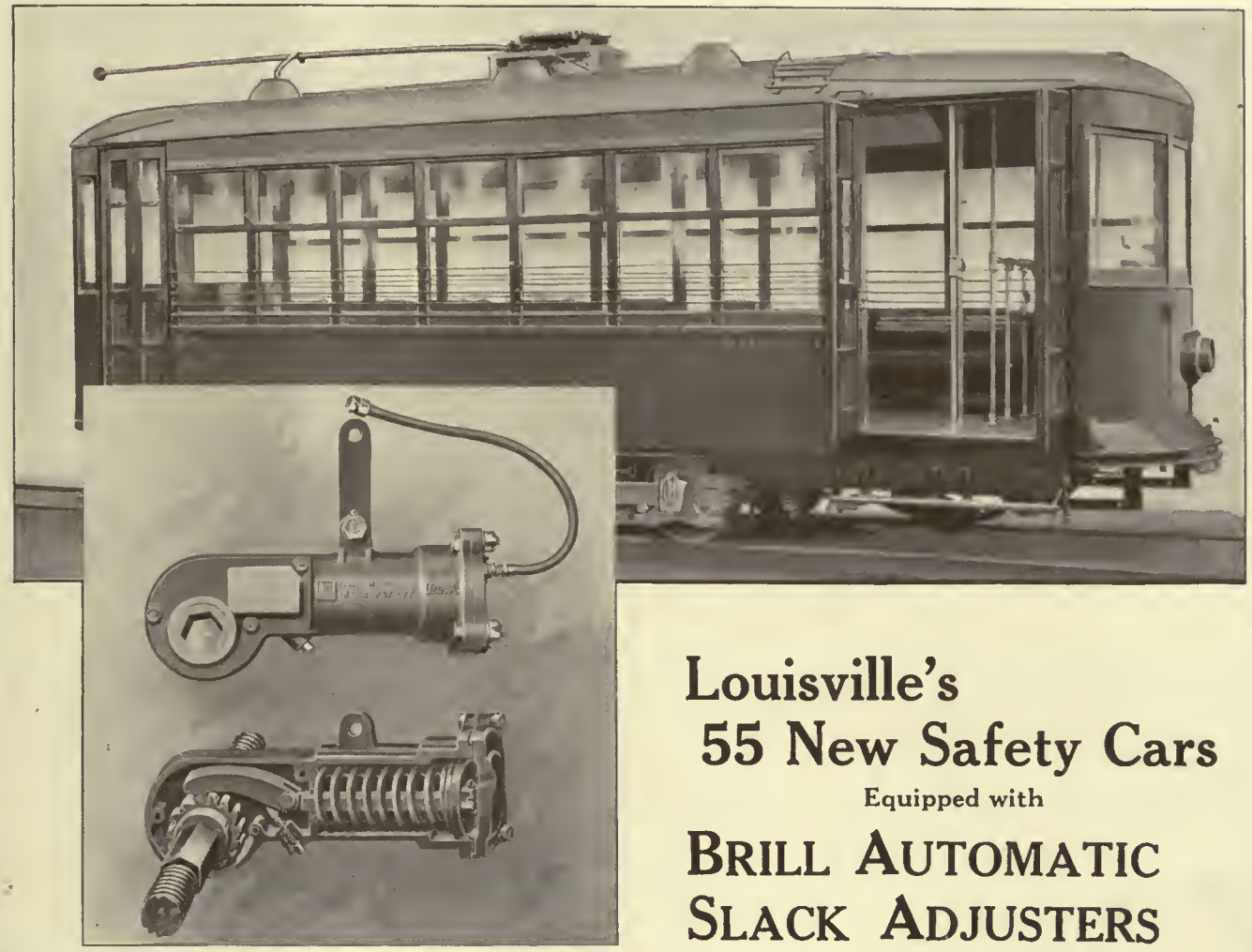
The tendency in present-day car construction for city, suburban and interurban service is toward light weight. For these light weight cars, there exists a demand for a type of truck in which comfortable riding and low maintenance expense have not been sacrificed, and the Brill No. 77-E Low-Level Truck is finding favor for this class of service.

Constructed with solid-forged side-frames there is less liability of breakdowns and its construction with such important Brill features as the Bolster Guide, Graduated Spring System and Half-Ball Brake Hangers enable the Brill 77-E Low-Level Truck to provide the most comfortable riding action under any type of light-weight double-truck car.

Write for copy of Bulletin No. 259.

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Equipped with

BRILL AUTOMATIC SLACK ADJUSTERS

The Brill Automatic Slack Adjuster has been adopted by many railway companies as standard equipment for their Birney Safety Cars. To these has just been added the Louisville Railway Company, which recently received fifty-five new Safety Cars built by us, all of which were equipped with this new Air-Operated Slack Adjuster for compensating for wheel and brake shoe wear.

Its application direct to the bottom brake rod is an assurance of the absence of lost motion, and the fact that it operates only when brake adjustment is necessary reduces maintenance to the minimum.

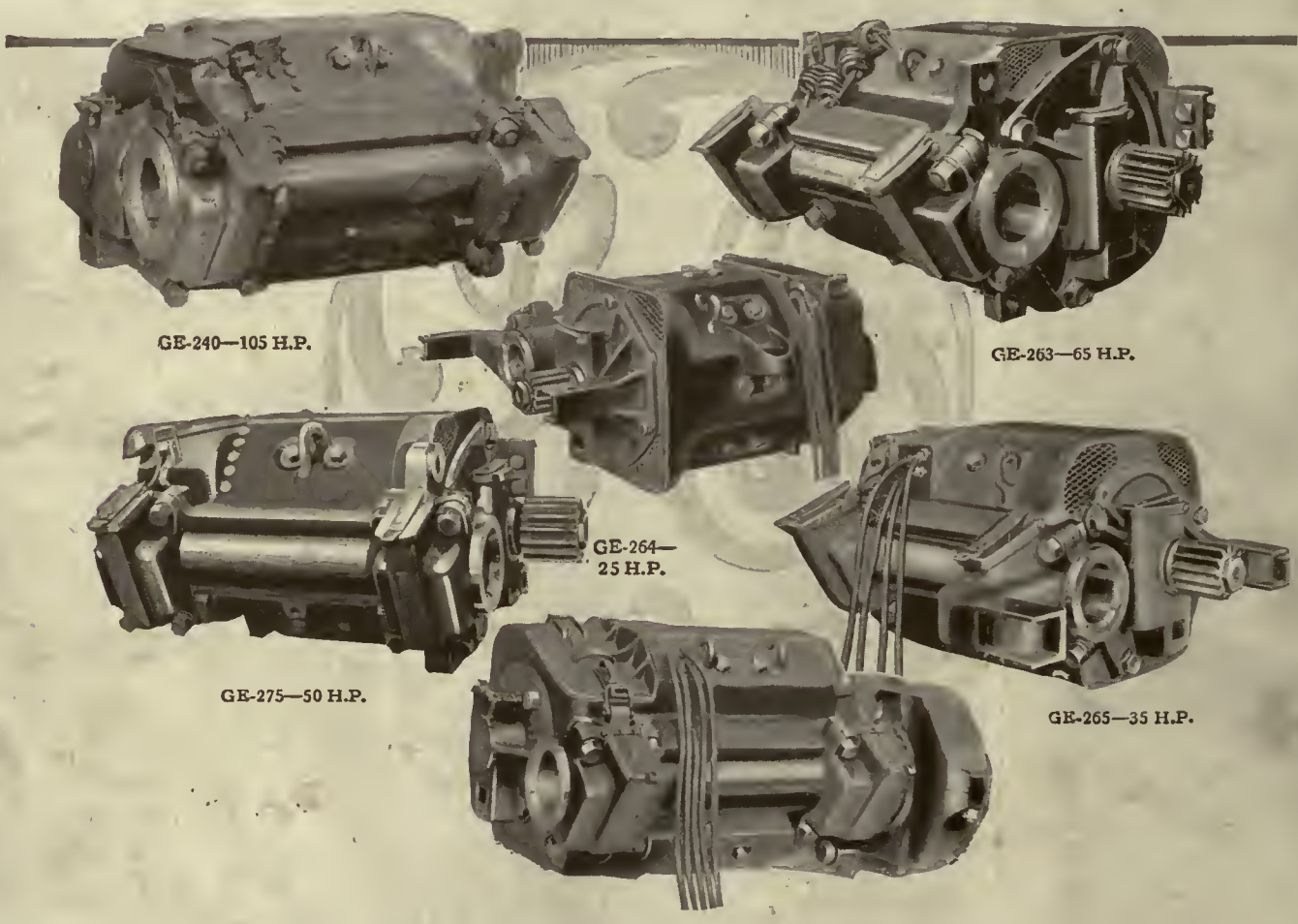
With Brill Automatic Slack Adjusters on your Safety Cars your brake rigging is always adjusted and safe and efficient brake operation is assured.

Write for full particulars.

THE J. G. BRILL COMPANY
PHILADELPHIA, PA.

AMERICAN CAR CO. ST. LOUIS MO. — G.C. KUHLMAN CAR CO. CLEVELAND, OHIO. — WASON MANF'G CO. SPRINGFIELD, MASS.

Maintenance is Less with Modern Motors



—and service is improved

Records of a large number of railway motors which have been in service 15 to 20 years show annual maintenance and inspection costs of $120 to $250 per motor.

Similar records on modern G-E railway motors show annual maintenance and inspection costs of only $35 per motor.

Investigate the savings in operating costs, and the increased reliability of service which can be obtained by replacing your older machines.

General Electric Company

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Schenectady, N.Y.

Sales Offices in
all large cities

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ELECTRIC RAILWAY JOURNAL

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PNEUMATIC TIE TAMPERS

Enable small gangs to equal the work output of large ones

A five man gang with I-R Pneumatic Tampers will tamp more track and do a better job than sixteen men hand tamping.

INGERSOLL-RAND COMPANY
11 BROADWAY, NEW YORK CITY

Offices in all principal domestic and foreign cities
For Canada refer Canadian Ingersoll-Rand Co., Limited, 260 St. James St., Montreal

Ingersoll-Rand

170-TT

Advertising For Freight



The advertisement reproduced in the circle to the right, speaks for itself.

Why not follow the example of such roads?

They do not wait for business to come to them—

They go after it.

Baldwin-Westinghouse Electric Locomotives and Westinghouse Baggage-Car Equipments will haul your freight economically and provide dependable service.

FAST FREIGHT SERVICE
INDIANAPOLIS TO LOUISVILLE

Early Morning Delivery to Both Cities

THROUGH RATES

Louisville, Ky. and Intermediate Points
TO
All Points Reached by Electric Railways

Second Morning Delivery

Terre Haute, Lafayette, Logansport, South Bend, Fort Wayne, Ind.; Dayton, Toledo, Cleveland, Ohio; Detroit, Flint, Jackson, Lansing and Grand Rapids, Mich.

For Detailed Information See Local Agent

INTERSTATE PUBLIC SERVICE COMPANY

MEMBER ELECTRIC RAILWAY ASSOCIATION AERA

W WESTINGHOUSE ELECTRIC

Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pa.

Westinghouse

Vol. 61, *No.* 12 New York, March 24, 1923 *Pages* 503-548

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What the Subscribers Read

Broad Interest Has This Reader

1. Such articles as discuss in a general way the underlying causes affecting the industry as a whole.
2. "The News of the Industry."
3. Legal news.
4. Foreign news.
5. Articles discussing the trend and effect of legislative enactments, judiciary decisions and public opinion, affecting the electric railway industry.
6. Articles on economic and accounting principles.—*J. K., Consulting Engineer.*

Interested in Organization and Accounting

Those articles written by authorities in the electric railway business, letters appearing in the "Readers' Forum," "Financial and Corporate," articles on electric railway accounting.
—*J. O. B., Assistant Treasurer.*

Looking Out for Costs and Selling Ideas

Records of actual costs of doing work—particularly of unusual jobs and methods of doing the work. References to old friends in the personal columns. Articles on merchandising transportation with a view to selling it to the people on the sidewalk. This is more than "good service."—*D. F. C., Consulting Engineer.*

Watching Electrification Developments

We are especially interested in articles describing railway electrification, electric locomotives of all types, and the maintenance and operation of electric railway equipment. We find the JOURNAL of value in connection with information of this kind. The more of such information that you can present the better pleased we will be with the p[illegible]—*F. E. W., Manufacturer.*

Follows Trend of Engineering

Descriptions of apparatus designed. Discussions of engineering problems. Foreign installations and practices. Method of traffic handling. Economies in transportation. Developments.
—*F. E. W., Manufacturer.*

His Problems Apparent From This

Fares. Fare collection in multiple zones. Municipal ownership. Jitney regulation. Paving obligations.—*C. O. W., General Manager.*

Assured Protection

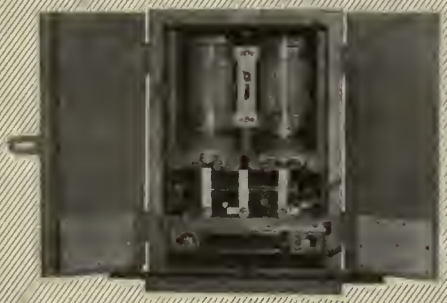
for your cars, your line and your station is obtained by installing Westinghouse-Direct-Current Lightning Arresters.



Type MP



Type K-3



Type AR



Type A Electrolytic

There is a Westinghouse Lightning Arrester exactly suited for every application and for every voltage.

Type MP for voltages up to 750.
For Car, Line and Station Use.

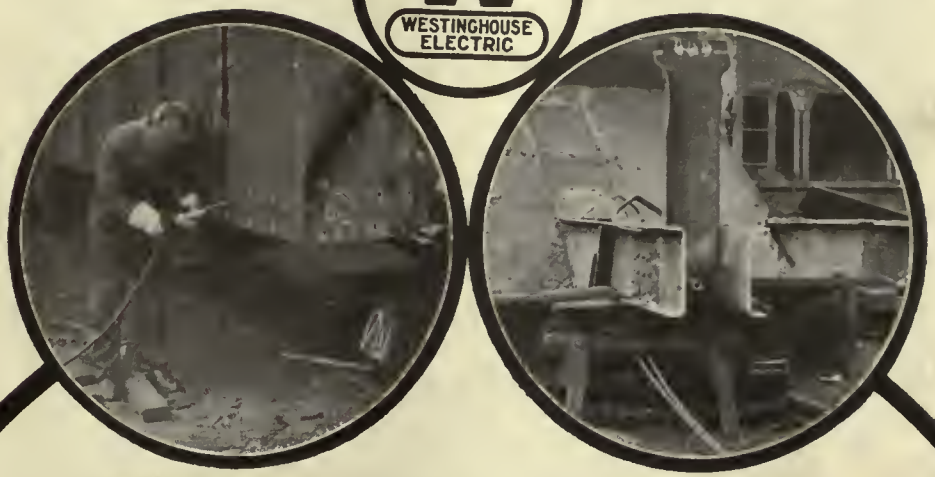
Type K-3 for voltages up to 1500.
For Car, Line and Station Use, practically no maintenance required.

Type AR for voltages up to 3800.
For Car, Line and small substations.

Type A Electrolytic, for voltages up to 2450, gives maximum protection for all stations, large or small.

Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pa.

Westinghouse



SPEED UP Steel Car Repairing with Electric Arc Cutting

Electric Arc Cutting is now a very important factor in meeting the great demand for repairing steel cars and speeding them into revenue earning service.

Greater output per man per day is the result. It takes only one man to burn off the heads of rivets and cut up the sides of steel cars for patches or new ends. Moreover, rivets are burned off without mutilating the sheet, the holes can be used over again. This fact is indeed important, especially when working on thin or deteriorated side sheets. Don't use rivet busters—burn them out.

Westinghouse equipment for this class of work has met with universal success. Leading railroads and car builders are saving thousands of dollars per month by using Westinghouse Arc Welding Equipment and the graphite process of electric arc cutting.

Write for bulletins describing in full the Westinghouse Electric Arc Cutting Equipment.

Westinghouse Electric & Manufacturing Company
East Pittsburgh, Pa.



Westinghouse



Easy to "get at"

THE ready accessibility to all parts is one of the most marked advantages of Westinghouse DH "Bungalow" Compressors.

Your inspectors find DH Compressors so easy to "get at" that a high state of efficiency, with minimum effort and expense, is always assured.

Three sizes—10, 16 and 25 cu. ft. displacement. Have you seen Publication 2016?

Westinghouse Traction Brake Company

General Offices and Works: Wilmerding, Pa.

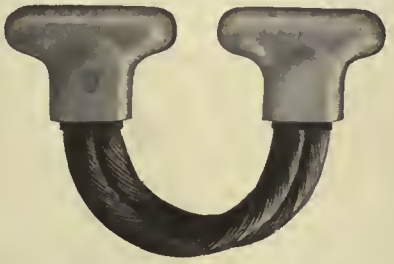
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TRADE MARK

WESTINGHOUSE TRACTION BRAKES

Saving money by neglecting the rail bonding is like cutting down the grocery bill by eating at a hotel



Type AW-8 Bond for Ball of Rail
Also made for Base of Rail

O-B Arc Weld Bonds have four fundamental features which simplify installation and make a better weld possible.



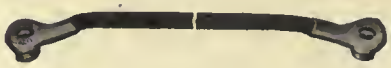
Type ST-2 Bond

O-B Gas Weld Bonds were pioneers. They are still first.



Type F-3 Bond

Concealed Type of Bond, installed under splice bar



Type EP-2 Bond

A long bond for around the splice bar. Especially valuable on joints where rail movement is considerable

O-B Stud Terminal Bonds are made in all lengths and capacities with either compressed or pin-driven terminals.

You are paying more for poor bonding than good bonding costs.

O-B Bonds are good bonds.

The Ohio Brass Co.

Mansfield, Ohio, U.S.A.

MEMBER AERA

New York Philadelphia Pittsburgh Charleston, W.Va. Chicago Los Angeles San Francisco Paris, France

Products: Trolley Material, Rail Bonds, Electric Railway Car Equipment, High Tension Porcelain Insulators, Third Rail Insulators

Insurance plus Marsh & McLennan Service

Additions and Betterments

When plans are taking shape for additions and betterments, you can profitably employ the services of Marsh and McLennan engineers.

They enable you to safeguard profits, eliminate hazards and reduce insurance cost.

Business executives of many of our large corporations have used this service profitably.

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175 W. Jackson Blvd. Chicago, Ill.

Minneapolis
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Duluth
Columbus
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Seattle
Cleveland
Winnipeg
Montreal
London



ALTHOUGH we are urging the use of Steel Tie Track Construction we cannot tell you with a cost accountant's precision its exact cost.

You can, however, by careful estimates based on other's experience, very closely approximate the cost of Steel Twin Tie Construction for your 1923 work.

The figures above are quoted from one of the detailed cost records kept by customers on 1922 work which, with other data, we will be pleased to send to any interested railway man.

THE INTERNATIONAL STEEL TIE CO.

Cleveland



Make this as good as new



with the

RECIPROCATING TRACK GRINDER

A Real Rail Restorer!

Not only do the corrugations disappear, but under the action of the grinding blocks of the Reciprocating Track Grinder, the rail head resumes its original shape. That's because these grinding blocks automatically assume the contour of the original rail-head, and *keep it* without requiring constant dressing.

Longer Life of both track structure and rolling stock result from the elimination of corrugations. This is a maintenance proposition that pays in every way.

Do your welding and grinding with AJAX *and* ATLAS

Electric Arc Welders

A 155 lb., convenient and simple electric welding outfit. Its high ampere output makes it especially desirable for electric railway lines where the voltage is sometimes low.

Rail Grinders

with this light, fast and efficient rotary grinder, built-up joints and special work can be smoothed off in shortest time and without delaying traffic.

Railway Track-work Co.

3132-48 E. Thompson St., Philadelphia, Pa.

30 Church St, New York

AGENTS:

Chas. N. Wood Co.
Boston

Atlas Railway Supply Co.
Chicago

Electrical Engineering & Mfg. Co.
Pittsburgh

P. W. Wood
New Orleans

Equipment & Engineering Co.
London, Eng.

North, East, South, West!

KEYSTONE
CAR SPECIALTIES

Illuminated Destination Signs
Steel Gear Cases
Motormen's Seats
Faraday Car Signals
Lighting Fixtures
Golden Glow Headlights
Headlight Resistances
Air Sanders
Trolley Catchers
Shelby Trolley Poles
Rotary Gongs
International Fare Registers
Fare Register Fittings
Samson Cordage
Air Valves
Cord Connectors
Trailer Connectors
Automatic Door Signals
Standard Trolley Harps
Standard Trolley Wheels

Check off your wants and send for respective data sheets today

You'll find ranking railways of the country specifying from this list

If we started in to enumerate the systems satisfactorily using one or more of the Keystone Car Specialties listed on this page, we'd have to mention nearly every electric railway line in the United States. This universal approval of Keystone Specialties is very gratifying, but we hope to see our good friends standardizing on the *complete line* of Keystone Car Specialties.

Maybe you haven't the entire file of Keystone data sheets. Shall we send them?

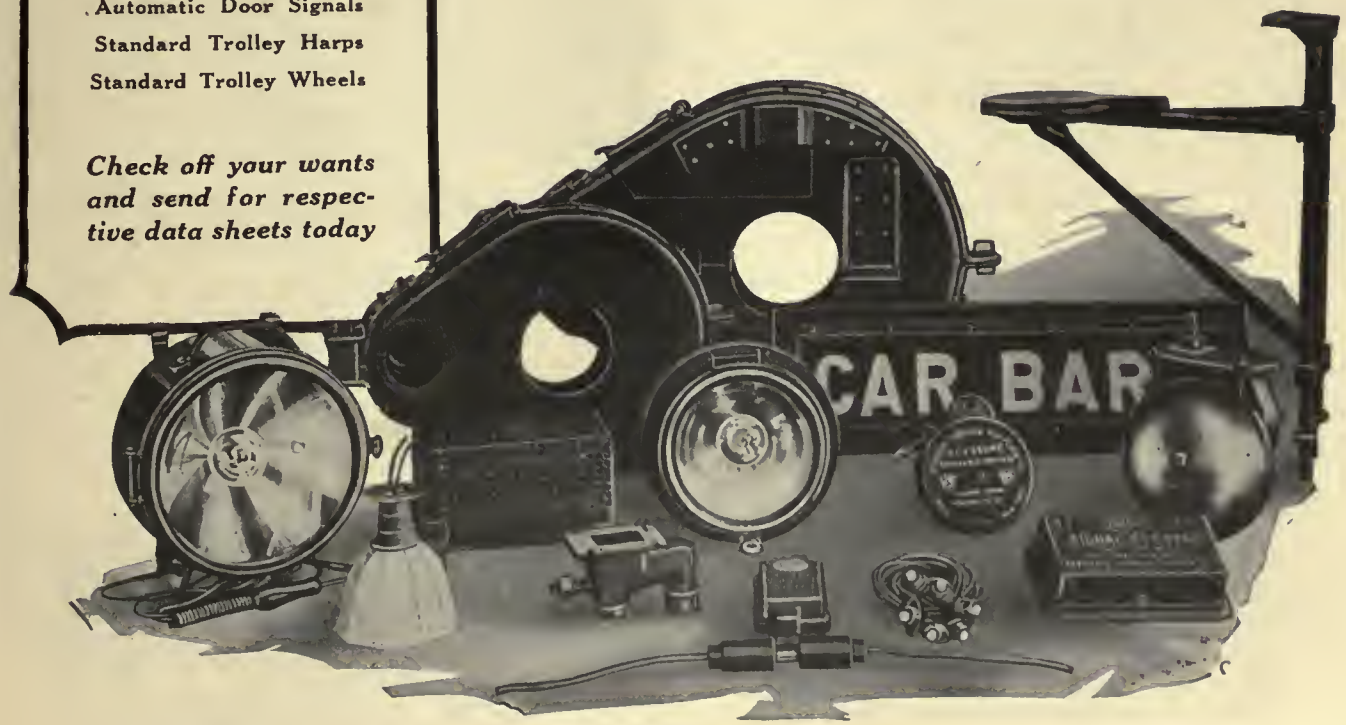
ELECTRIC SERVICE SUPPLIES CO.

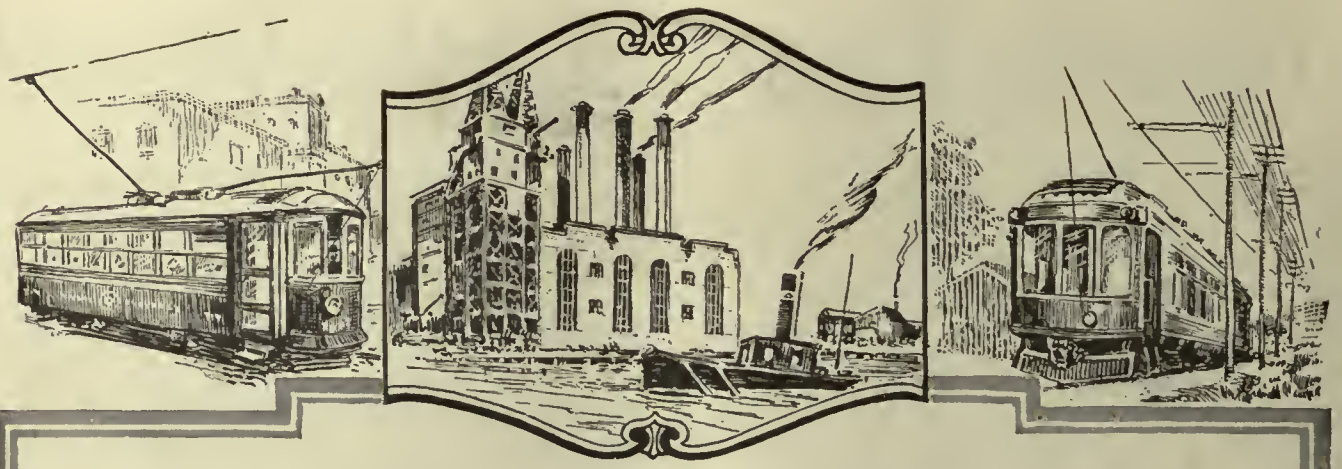
Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA 17th and Cambria Streets
NEW YORK 50 Church Street
CHICAGO Monadnock Bldg.

Branch Offices: Boston, Scranton, Pittsburgh

Canadian Distributors:
Lymsn Tube & Supply Co., Ltd., Montresl, Toronto, Winnipeg, Vancouver





Gosh, how the contracts roll in!

North, East, South and West electric street railways are demonstrating their faith in Texaco—

They say it with contracts!

Contracts count.

And a contract with The Texas Company for lubrication counts especially, because of what's behind it.

(Just to touch the high spots) here's what is back of a Texaco contract:

A huge, dependable organization which, in itself, controls every process of production, refining, handling, and distribution.

The vast stocks of Texaco Lubricants, always on hand, are of a high grade and constant quality. As we ourselves make them, sell them, ship them, we can and do guarantee their uniformity.

Texaco has more than adequate shipping facilities. Its OWN tank cars. Its OWN warehouses dotting the Country. Its OWN motor vehicles for local delivery.

Nothing in the way of lubrication is foreign to Texaco. We are lubricating every kind of equipment which uses or produces power. We can and do supply high grade oils fully able to meet your every requirement whether for Power house, Sub-station, Rolling stock or Track—also burning oils and gasoline.

In addition to all this:—Texaco Engineering Service—

the unstinted service of experienced, practical, capable Lubrication Engineers, specialists in street railway work, who will investigate, advise, demonstrate and co-operate with new or old clients for the one purpose of bringing down maintenance and lubricating costs to the lowest possible level, and keeping them there.

Even before you sign a contract, they will be glad to explain the proposition, survey your road, if necessary, and make practical recommendations.

You'll like the way they go about things so much that it is quite likely that YOU will be the one to suggest a contract.

There Is a Texaco Lubricant for Every Purpose

TEXACO

THE TEXAS COMPANY

TEXACO

DEPT. R-J. 17 BATTERY PLACE . NEW YORK CITY
HOUSTON . CHICAGO . NEW YORK
OFFICES IN PRINCIPAL CITIES



Over 10,000 cars, here and abroad, are equipped with one or more of these—

NATIONAL PNEUMATIC

Door and Step Control
Motorman's Signal Lights
Safety Interlocking Door Control
Door and Step Operating Mechanism
Multiple Unit Door Control

Let us quote for your new cars

National Pneumatic Company, Inc.

Originators and Manufacturers

PRINCIPAL OFFICE: 50 Church St., NEW YORK

Philadelphia—Colonial Trust Building Chicago—McCormick Building

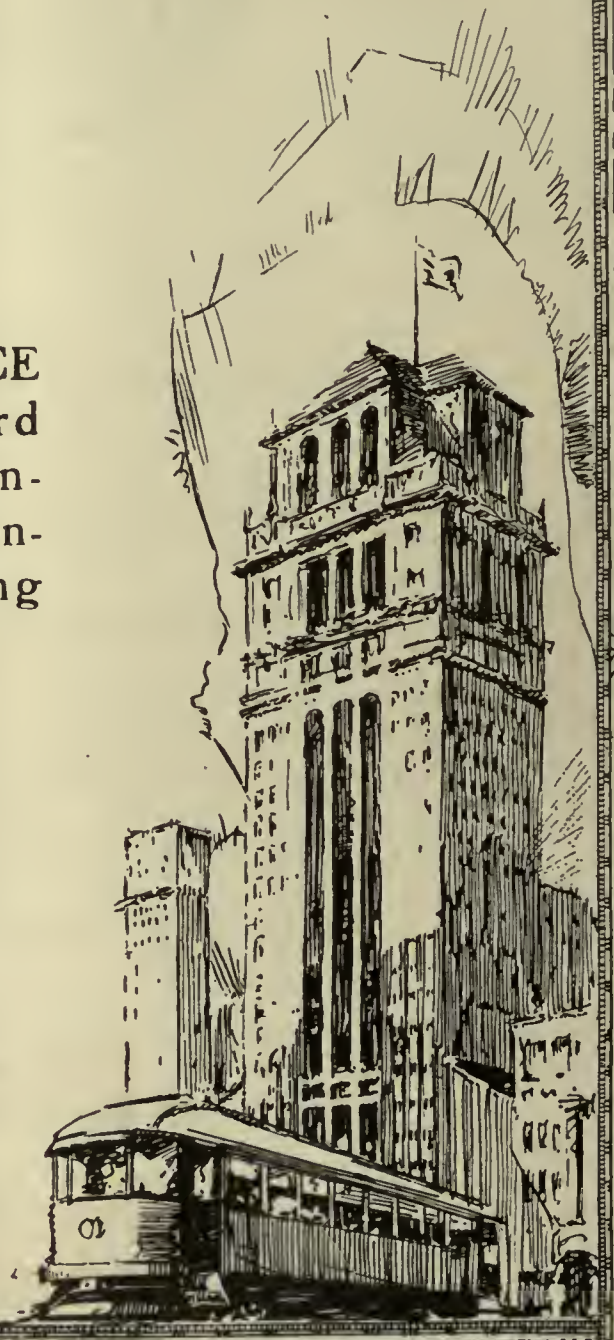
Works—Rahway, New Jersey

Manufactured in Canada by

Dominion Wheel & Foundries, Ltd., Toronto, Ont.



COLLIER SERVICE sustains car card space value by maintaining a nation-wide organization of car advertising experts.



CANDLER BUILDING, THE HOME OF COLLIER SERVICE.

Barron G. Collier
INCORPORATED

CANDLER BLDG NEW YORK

The Enco S. A. R.—*How It Is Revolutionizing Oil Burning*

No one achievement has done more to broaden the industrial applicability of fuel oil than the Enco S. A. R.—the only successful use of steam atomization in conjunction with air registers rather than checker work.

THIS method of oil burning, developed by The Engineer Company and known as the S. A. R. System, has several novel features and many advantages. In this system a steam atomizing burner producing a hollow cone spray is used with an air register.



An Enco S. A. R. Unit With Radiation Plate Removed

This arrangement offers the following advantages:

LOW OIL PRESSURE, not over thirty pounds, permitting the use of low pressure pumps, heaters, strainers and piping.

LOW OIL TEMPERATURES, saving steam and, in connection with the low pressure, reducing the danger from leaks.

SIMPLICITY OF OPERATION. The burners will run for weeks without cleaning. No special training is required to operate them.

WIDE VARIATION IN CAPACITY—from a pilot light to over 100 gallons per hour without change in the burner, simply by varying the oil and steam pressures. As the spray angle is determined by the holes in the nozzle and by the draft, the hollow cone fills the furnace opening at all capacities.

ABILITY TO REACH RATINGS far above those obtained by steam atomizers over the customary checker work. Rating as high as 250% have been reached with natural draft and much higher with both induced and forced draft.

LOW FLAME VELOCITIES with probability of little or no damage to furnaces and tubes or boiler shells at high ratings.

ADAPTABILITY to forced and induced draft.

NO CONCENTRATION OF HEAT to produce a blow torch effect, as the flame is soft and diffused.

CAPACITY. As many burners may be installed as the area of the boiler front permits, owing to the method of admitting air for combustion around the burners through the front wall, instead of underneath the burners.

LOW STEAM CONSUMPTION for atomization due to the highly efficient method of atomizing and the superheating of the oil spray as it issues from the burner.

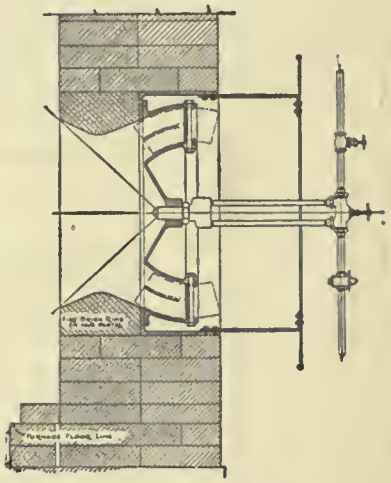
SMALL LIABILITY OF DAMAGE to furnaces or boilers due to inefficient operation.

ABILITY TO OPERATE AT HIGH RATINGS at low draft, because of the register design and the fabric of the hollow cone, which offers little or no resistance to the entering air and burns largely on surface contact.

GOOD HEAT DISTRIBUTION IN THE FURNACE. A large proportion of the heat is developed in the front part of the furnace. As the drive is lost soon after the spray leaves the nozzle, the furnace is filled from side wall to side wall and from front to bridge wall with the much sought "floating flame."

RELIABILITY OF OPERATION. Even under adverse conditions, very good results are obtained. Though cold, heavy or dirty oil, fluctuation in pump pressure, wet steam, etc., are to be avoided if possible, assurance that the equipment will function and steam can be gotten up and maintained, even with such conditions, is of value.

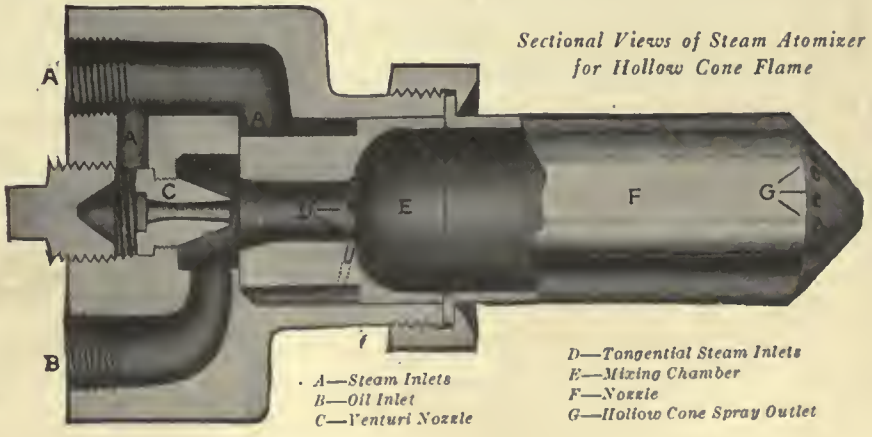
A radiation plate mounted in front of the register serves the double purpose of protecting the operator from possible flare-backs when lighting off and pre-heating the entering air by the reflected radiant heat from the furnace.



Sectional View, Showing Assembly of S. A. R. Unit in Boiler Wall

By reason of their unusual experience in combustion engineering, the Engineer Company has been peculiarly fitted to cope with the subject of oil burning. It is in a position to render a complete advisory and engineering service as well as to supply the oil burning equipment best suited to the needs of each plant.

Sectional Views of Steam Atomizer for Hollow Cone Flame



A—Steam Inlets
B—Oil Inlet
C—Venturi Nozzle
D—Tangential Steam Inlets
E—Mixing Chamber
F—Nozzle
G—Hollow Cone Spray Outlet

THE ENGINEER CO.

17 Battery Place **New York City**

Branch Offices in all the Larger Cities

Tailor-Made Advertising

One great fact must be remembered by those who have made the decision to advertise. The advertising plan must fit the business to which it is applied. There are no ready-to-wear advertising plans; each one must be tailor made.

The purpose of advertising is to increase business and *not* to relieve any one of his arduous duties. The manufacturer's salesman who regards advertising as a substitute for his own efforts has missed the point. His efforts are needed more than ever to support the advertising and put it across. His reward is larger sales.

Likewise, the merchant who chooses the advertised brands because they are "soft and easy" selling, has overlooked the essential idea. Certainly they sell easier; but this is not the big important truth. Rather, he should see that the manufacturer's advertising is an instrument put into his hands for increasing his volume and speeding up his turnover. Looking at the matter in this light, he will bend every effort to co-operate with the advertising and seek to make it pay him additional profits.

Advertising is not a form of perpetual motion that goes on forever without human assistance. The biggest problem any man has to settle after he has determined to advertise, and decided *how* to advertise, is this: How can I *use* my advertising so as to get the most out of it? Without close-linked co-operation it dissipates its force into air.

It must be hitched on to a business properly. Then it must be utilized with intelligence. When these conditions are fulfilled it does a type of work for which there is no efficient substitute.

[Published by the Electric Railway Journal in co-operation with The American Association of Advertising Agencies]



Lubrication—a subject worthy of discussion

Realization of the fact that lubrication is a regulating factor in operating expenses that may run into many thousands of dollars, makes the selection of proper lubricants a much more important matter than the mere purchase of oils.

The opinions and judgment of practical mechanical and operating heads are invaluable in arriving at a decision that will return your road the best service value.

Galena Oils have been specified on hundreds of electric properties because they have given conclusive proof of their ability to deliver exceptional service, keep equipment in perfect running order and reduce to a minimum the expenses of repairs and time losses, that, with inferior lubrication, run into high figures.

"When Galena Service Goes In—
Lubrication Troubles Go Out!"

QUALITY · SERVICE · ECONOMY — GSO — GALENA OILS

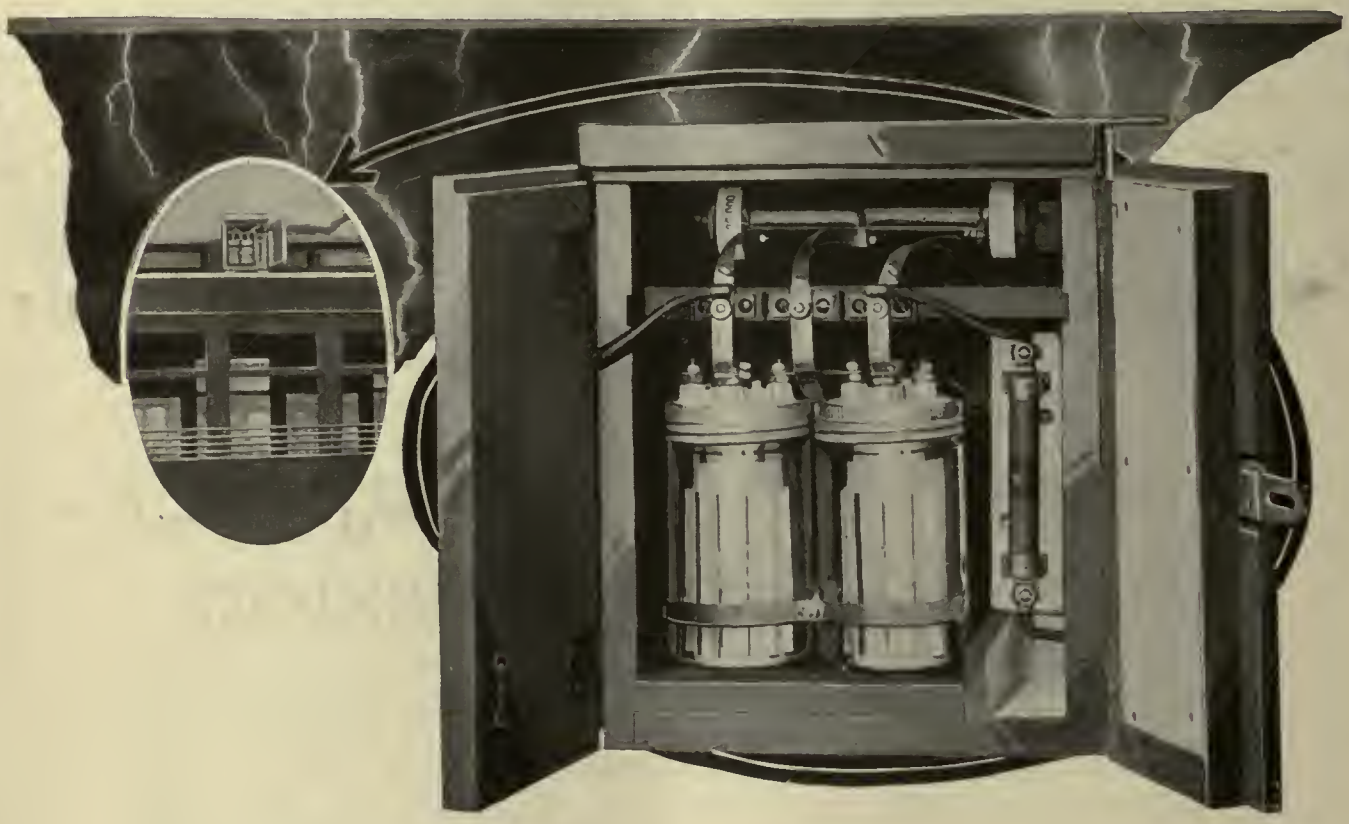
Galena-Signal Oil Company

New York Franklin, Pa. Chicago

and offices in principal cities

QUALITY · SERVICE · ECONOMY — GSO — GALENA OILS

Do you know what lightning costs you?



Consider, too, your service

While searching for every means to cut down maintenance costs, have you considered eliminating repair bills for damages from lightning?

Service records show that our D-C. Aluminum Arresters will prevent practically all lightning damage to car equipments. For instance, on 50 roads with 5000 cars equipped with them, there were only 43 cases of slight damage from lightning during a whole year—averaging less than one per railway and less than one for every hundred cars. Some of these equipments have suffered no damage from lightning for several years since the arresters were installed.

Such facts are significant. They call for a study of your maintenance records. And probably you will find one item of expense that the D-C. Aluminum Arrester can save you.

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ELECTRIC RAILWAY JOURNAL

Consolidation of Street Railway Journal and Electric Railway Review
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"So the People May Know"

IN THE series of bulletins issued on the Detroit municipal street railway system, Walter Jackson continues to praise the practices adopted by the city's engineers. Sometimes this desire appears to have led him into statements that are difficult to sustain. For instance, when he says that "a hard-drawn copper wire is especially uncertain because only the skin of this kind of wire is hard" it hardly squares with experience. Of course it is true, as he says, that a knowledge of wire wear, had the D.U.R. left the record, would have helped to prevent breakdowns. He estimates a loss in revenue of $12,000 a month from trolley breakages, resting his argument on the statement, "Suppose that the breakage of a trolley wire has caused the loss of only 100 car-miles," and combining it with average revenues for the entire system of 40 cents per car-mile. Situations can be conceived where the wire may be broken and no car-miles lost, as a delay of a few minutes does not imply that the cars would not complete their trips. The loss of 100 car-miles, referred to as the minimum likely loss by Mr. Jackson, would mean, for instance, that each of ten cars actually failed to make a 10-mile trip. Since he states that trolley breaks averaged ten a day, there must have been 1,000 car-miles loss every day.

It is pointed out that the city is using the trainmen "efficiently, humanely and with minimum outlay for overtime and bonus rates." To illustrate this he cities the Woodward Avenue schedule, which has forty straight runs out of 114, or only 35 per cent of the total. The schedule also includes sixteen three-piece runs, or 14 per cent of the total. A street railway that today can get away with such a schedule is indeed fortunate. One prominent system comes to mind whose men demand and get 60 per cent straight runs, with three-piece runs practically barred.

His severe condemnation of the single-end car would indicate that many operators of large properties are wholly incompetent. He says quite a large school of electric railway operators "deliberately crippled the flexibility of their railways by adopting what is termed the single-end car, but which might more appropriately be called the one-armed car." This indicts the managements in a score of cities where the single-end car gives excellent service.

The climax is reached when, with a series of "supposes" as a basis, the consultant attempts to show that the average fare in Detroit is the lowest in the United States, 3.86 cents. If there is any authority back of this figure it is not given. The Department of Street Railways keeps statistics that might well be used for such a comparison so that the public might have figures based on facts. From the actual figures, the average fare per total passenger during January, 1923, is found to be 4.03 cents.

Numerous other illustrations could be cited, but these suffice to show the character of the consulting work acceptable to the municipal operators in Detroit. Of course, it is to be remembered that an election is to take place April 2 and the people must be "prepared."

A Wide Acquaintance Helps to Foster Good Will

THE electric railway executive should be well known in his community in order that the problems of his company shall receive the fair consideration they deserve from the public. There is probably no better time for him to meet the representative men of other industries than at midday lunch. Chambers of commerce, rotary clubs, athletic clubs, the public restaurant are all desirable places in which to spend the luncheon hour. Acquaintances and friendships made at these luncheons may some day prove of great benefit. On the other hand, if the officials of a railway company have a clannish spirit, lunch together by themselves, and associate very little with the general public, they are throwing away an opportunity to foster good will. The company-furnished lunch, for this reason, is not as desirable as might be thought when considering only its value as a measure to increase intra-company business efficiency.

A Word in Defense of the Unpopular Questionnaire

THIS is the season of the questionnaire. During the next few weeks electric railway department heads will be bombarded by committees with lists of questions to answer for the benefit of the industry. Each year the number grows larger, or at least it appears to do so. Some of the victims are inclined to feel that research by this method is being carried too far.

Of course the complainants realize that the questionnaires are intended for their benefit; that there is "nothing in it" for the committees which send them out. In fact the questions are framed at meetings where the attendants not only are spending their time and energy but the cost of attending which must be borne by themselves or their companies. Further, the complainants appreciate the fact that the questionnaire furnishes the most practicable means, and in many cases the only means, for securing information as to present practice. Many of the investigations aim toward standardization, which is possible only if reasonably full knowledge of the practice of the electric railways generally is available. In spite of the above facts, however, men question the usefulness of the ubiquitous data sheet.

There is no doubt that some questionnaires are not as carefully framed as they might be. In fact, some

could be omitted altogether, the information being gathered by other means. This points to the need for very careful consideration, first as to whether any questionnaire should be sent out, and, second, as to the merit of the details of the questionnaire.

On the whole, however, the requests of the committees of the American Association and its affiliates are reasonable. If they are thought to be otherwise the way to remedy the matter is not to pigeon-hole the communications or consign them to the waste basket. This is a negative, although popular, procedure. It would be far better to answer the questionnaire and then frankly state to the committee chairman that the request is unreasonable and that the probable good to be accomplished from complying does not warrant the necessary expenditure of time and effort. Such comment would at least be positive. It should be remembered, however, that progress in the electric railway industry, as in other fields, depends upon data—facts. These can only be secured from the places where they are produced, namely, from the railway properties.

Party Whip Being Wielded in New York

GOVERNOR SMITH of New York is growing restive. He scents defeat ahead for his program of public utility bills. In consequence he is using the whip on the members of his party in the Senate, which is Democratic, while on the members of the Assembly, which is Republican, he is seeking to achieve his ends by duress. He is, of course, interested in having his program of elective home rule put through for the cities of the state not included in Greater New York, but he is particularly solicitous for the passage of the measure which would give Mayor Hylan a free hand in New York City.

As for the New York City bills they are so loosely drawn, so iniquitous in the degree of latitude that they allow Mayor Hylan, as to be laughable if they were not at the same time in intent disastrous to the city. At first newspaper sentiment seemed to be to let the New York City bill pass and to give Mayor Hylan the necessary rope with which to hang himself. More sober opinion, however, has veered around to the position that however desirable it might be to have the Mayor commit political suicide, there is a price limit beyond which the city dare not go. On his part the Mayor is still berating the interests and threatening to run for office again if the measure for New York City is defeated.

The outlook is, indeed, most alarming. If the bills pass the Mayor most certainly cannot make good. If the bills do not pass the Transit Commission's hands can be tied by the refusal of the New York City Board of Estimate to appropriate money to be spent for new construction by a commission which has survived a régime at Albany that was overwhelmingly defeated at the last election. Shrewd lawyer that he is, Governor Miller either failed to take into account the power of the Board of Estimate to block his program by refusing appropriations for new construction or else he misjudged the political situation and concluded that because the merit of his measure warranted it, he would be backed by the election in New York of a local board in sympathy with his program.

The traction companies may or may not have finally accepted in toto the plan which the present New York Transit Commission advanced for the unification of the local lines there. It may or may not have been possible to reconcile the difference of opinion which developed between the companies and the commission over the valuation figures promulgated by the commission. This much, however, is certain. The work of the present commission has been constructive. In the case of the Interborough Rapid Transit and the Manhattan Railway readjustment it achieved something of real benefit to the residents of the Greater City. As for the present measure the arguments of its proponents have not even the merit of being plausible.

Study the Sentiment of the Public You Serve

BECAUSE they felt that the street railway company was not treating them fairly, 500 residents of a Pacific Coast city recently held a mass meeting to agree upon the most effective ways and means of boycotting the local railway. A temporary organization was formed and more than 200 who attended the meeting, according to press reports, paid a $1 initiation fee to the treasurer to provide funds for attaining the desired ends. The first move was a program for canvassing every automobile owner in the district affected to pledge him to bring to and from work three men or women who otherwise would have to patronize the street railway. The secretary to the Mayor, who called the meeting to order, intimated that if jitneys appeared in competition with the railway company they would be immune from police interference.

It may be that this situation grew out of circumstances over which the railway company had no control, and perhaps no blame whatever can be attached to the officials of the company for not foreseeing the trend of public sentiment and, while there was yet time, taking steps to prevent its reaching such a high pitch. Quite apart from any discussion of the causes of such a situation, however, the effect is well worth analysis.

It is axiomatic that unless a public utility renders service that is satisfactory to the consumer and profitable to itself it is not on a sound economic basis. Antagonistic public sentiment is evidence of dissatisfaction and, moreover, profit, the other requisite of economic stability, is very likely to be lost when service is no longer satisfactory.

In the case of the electric railway, perhaps more than with any other utility, public opposition constitutes an almost insurmountable obstacle to success; or, to put it in more general terms, public sentiment takes precedence over almost any other consideration. One of the most important functions of the electric railway company executives, therefore, is the study of the trend of public sentiment in order that they may foresee wherein danger lies and take steps to appease any feeling before it crystallizes in any measure injurious to the company.

Consistency, Thou Art a Jewel

IT IS a fine thing for the electric railways to ask for co-operation from the public. They deserve it and ought to get it. But sometimes their manner of asking is not the most tactful. To cover several of the windows of a car with posters describing the company's effort to please its patrons is inconsistent. The function of windows is to admit light and let passengers see out. If the railway makes a sort of billboard of them, a good message may easily become an irritating notice.

Remodeling Power Plant for Fuel Oil Use

Berkshire Street Railway, Pittsfield, Mass., Is Changing Over Six Boilers, Using the Steam Atomizing System—A 100,000-Gal. Oil Tank, Which Is Filled from Tank Cars by Gravity, Provides Ample Reserve Supply of Fuel

OWING to the cost and difficulty of securing and storing its supply of coal for the power plant at Pittsfield, the Berkshire Street Railway is making extensive changes to permit the use of fuel oil. Six Altman & Taylor water-tube boilers, rated at 380 hp. each, are being remodeled to provide for economical burning of the oil in accordance with the steam atomizing system of the Engineer Company. Flexibility and reliability of oil supply were two of the important factors in the design.

The normal supply of oil is from a 100,000-gal. steel tank, placed at a suitable distance from the plant to comply with the rules of the National Board of Fire Underwriters, which prescribes a minimum distance of 75 ft. for tanks of this capacity. Oil can, however, be pumped directly from tank cars to the plant. The company ran two boilers in this way while the tank was under construction. Oil can also be reclaimed from the tank and pumped back into tank cars, which might be desirable in case of fire or if it were necessary to help out another oil-burning plant.

The steam atomizer system of oil burning was selected on account of the small space required for the pump and heater, the low pressure (45 lb.) and temperature (120 deg. F.) of the oil at the nozzles, and the flexibility of control. The consumption in the burners of 1 per cent of the generated steam was considered reasonable in view of these virtues.

Large Combustion Space Provided in the Boilers

In the remodeling of the boilers the first step was to remove the ash pits and move back the bridge wall to give an inside depth of combustion space of 11 ft. This bridge wall was erected on a substantial foundation of standard construction. It is 24 in. thick at the bottom, and comprises a 9-in. facing of No. 1 fire brick with a backing of No. 2 fire brick. The floor of the combustion chamber was laid up of fire brick on a cinder fill, with a 1-in. expansion space all around the lower two of the three layers of brick.

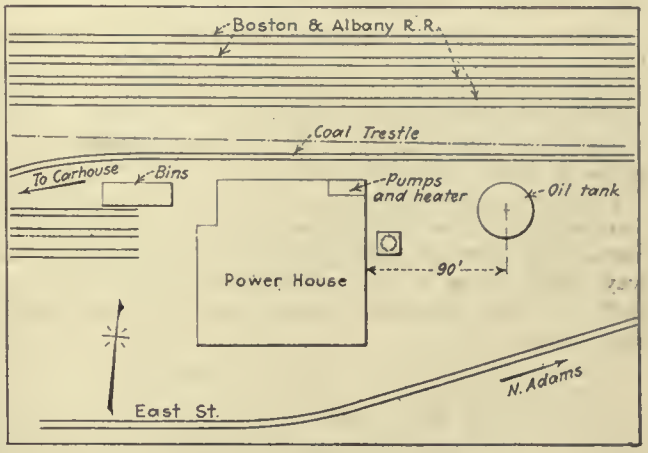
The design of the combustion space was governed, within the limitations of the existing dimensions of the boiler, by the following considerations:

First, it was desired to secure as low a velocity of the gases as possible, so as to allow ample time for combustion before they pass into the boiler proper.

Second, ample room was desired for flame travel, the idea being that the flame would about reach to the bridge wall. By thus keeping the flame well down in the furnace, long life of the tubes is secured and the lower tubes are not likely to become covered with slag.

Third, a liberal volume of furnace space permits comparatively slow combustion, with corresponding low furnace temperature. There is thus less burning out of the refractories, with less danger of burning out of the tubes.

Fourth, a deep combustion space gives large exposure of the lower rows of tubes to the flame, conducing to large absorption of heat in the first pass. The area of the first pass is large, and the gas velocity low, permitting ample time for absorption of heat in the tubes.

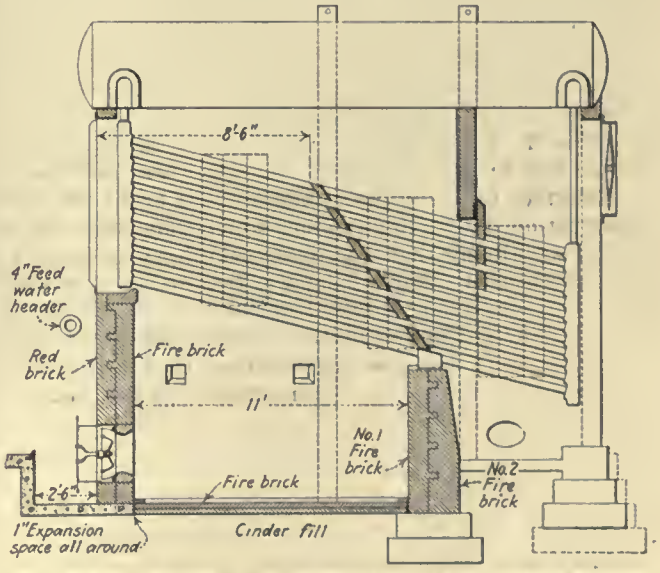


General Plan of Berkshire Street Railway Power Plant Property, Showing Location of Oil Tank, Oil Pumps and Heater, Coal Trestle, Etc.

The boilers at Pittsfield operate at about 0.06 in. of draft when giving 150 per cent of rating. They can be forced to 250 per cent. At the lower load the flue gases are estimated to have a temperature of about 480 deg. on entering the stack.

Baffling Was Given Special Attention

The arrangement of baffles is shown in the accompanying longitudinal section of the boilers and setting. The baffles are of the Turner type, consisting of corrugated tile, placed in the diagonal alleys which run from the top to the bottom of the boiler, with the pockets or resulting detached spaces between the tubes filled with fireproof plastic cement. A baffle thus constructed has a certain amount of elasticity, permitting it to accommodate itself to expansion and contraction of the boiler.



380-Hp. Boiler Setting, Arranged for Fuel Oil Burning

In setting, the plastic material detaches itself sufficiently from the tubes so that the latter may be replaced without breaking the baffle, provided that the tube is straight and reasonably smooth.

The joint between the front baffle and the bridge wall on which it rests is made by means of a special tube block, made of fire brick. The tube blocks interlock so as to form a continuous bond between the bridge wall and the baffle proper.

As will be noted in the section, the front baffle is inclined toward the front of the boiler, so as to give a tapering cross-section in the first pass for the gases, the depth reducing from about 12 ft. to 7 ft. This provides for a reduction in area to compensate for the reduced volume of the gases as they cool.

The rear baffle hangs from behind the curtain wall, so placed as to continue the tapering of the cross-section of the gas path, the tapering, however, being omitted in the last pass. By the time the gases have reached this, the third pass, they have practically reached flue temperature.

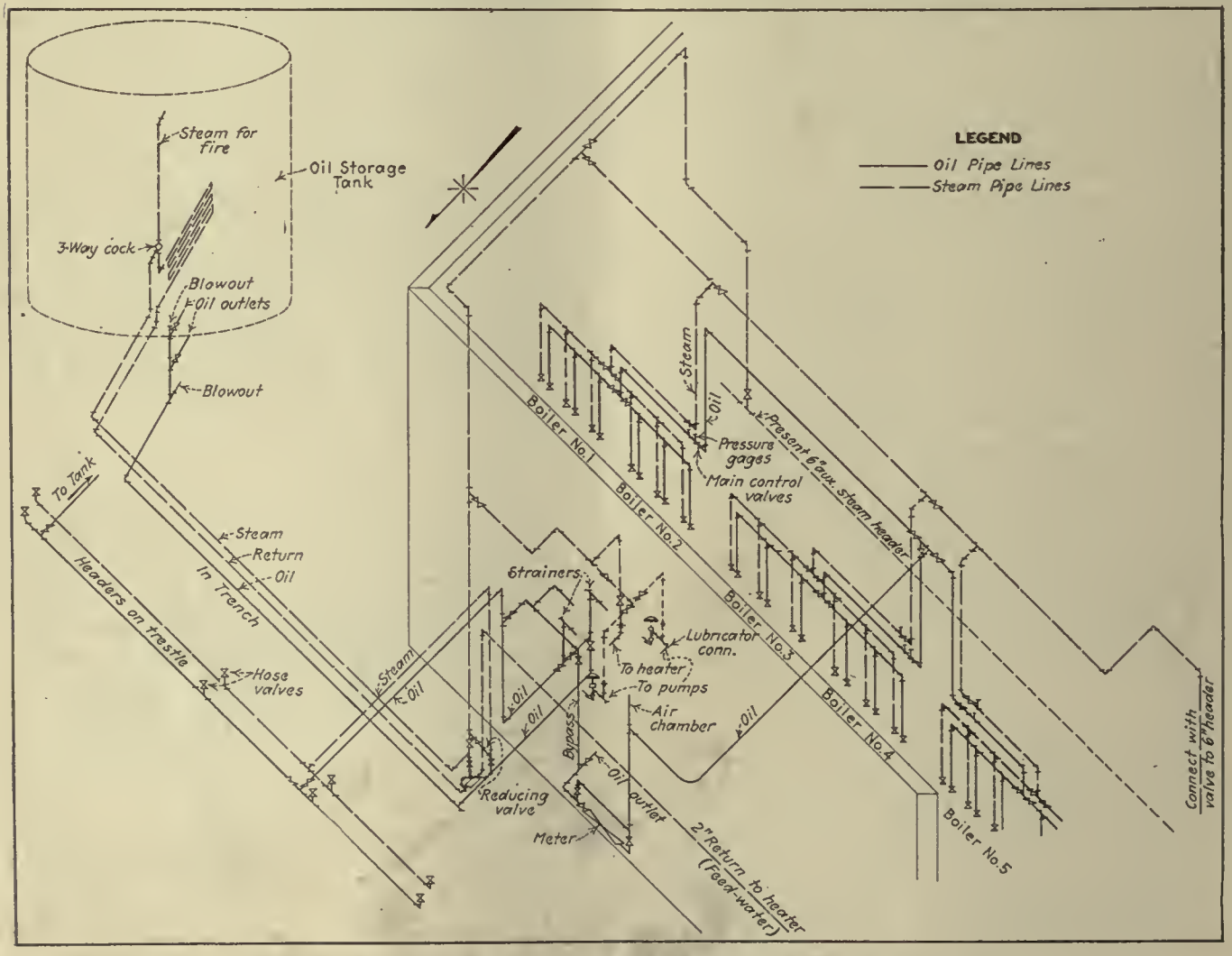
This arrangement of baffles not only serves the purposes mentioned, but also prevents the accumulation of soot. The soot which falls on the back of the front baffle, in the second pass, slides down into the soot chamber.

The second step in the reconstruction was to build, in place of the metal fronts of the boilers which had been removed, an 18-in. brick wall, the inside 9 in. of fire brick and the outside of red brick. This wall was built up from the bottom of a trench, 2 ft. deep and floored and walled with concrete, which was necessary in order to get the burners low and to permit the utilization of all of the ash-pit space for combustion purposes. Another feature, possibly the essential one, in thus placing the burners low was to insure the combustion of the oil as far as possible below the tubes.

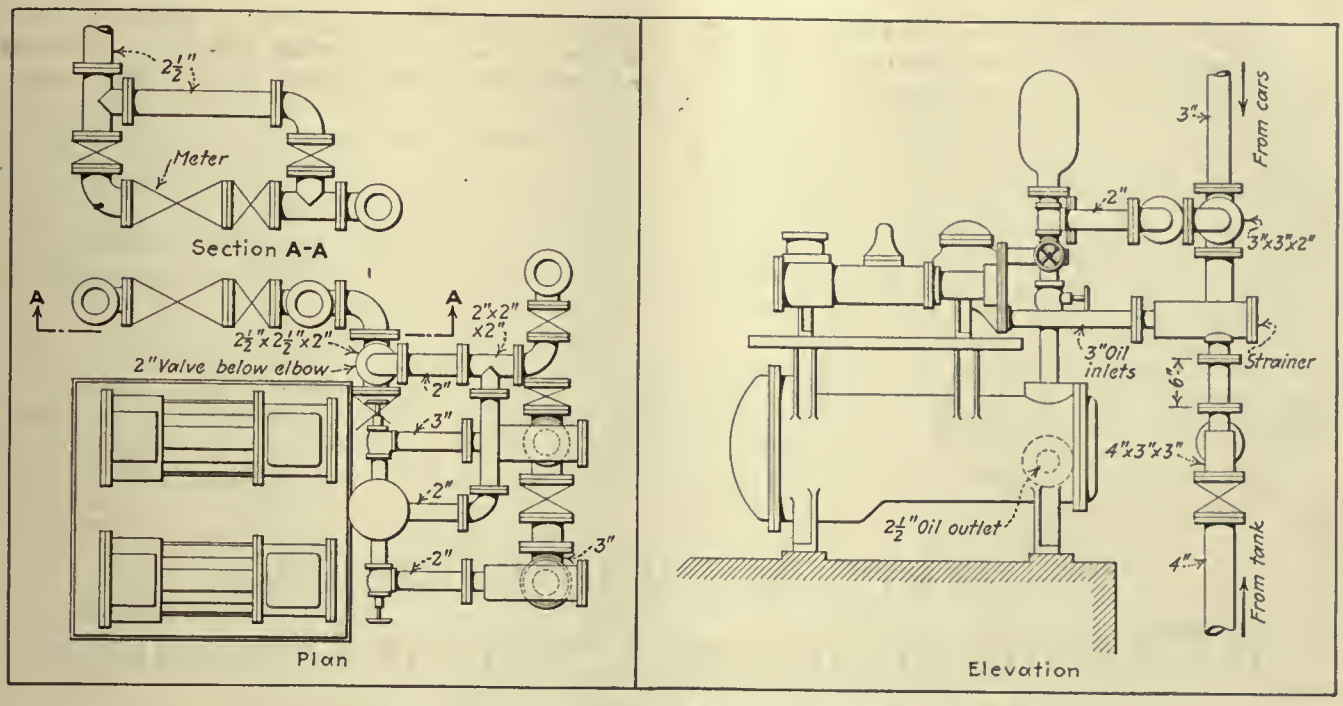
There are three burners for each boiler, each having its own oil and steam lines. Each burner occupies a space in the front wall 28 in. square, and is set in special tile furnished by the manufacturer. The burners are of the well-known Enco C atomizer type.

The principle of this burner is shown in the accompanying cross-section. The steam enters by the passages AAA, part discharging into the mixing chamber E through the Venturi nozzle C. Oil enters through inlet B and is drawn into the jet of steam and partially atomized as it is thus forced into the mixing chamber. Just before reaching the mixing chamber, the partly atomized oil is given a rapid rotary motion by the tangential steam jets D, which receive steam from A. This whirling motion increases the atomization in the mixing chamber. The partly atomized oil is discharged through the hollow cone spray outlet G, in the nozzle F, and is completely atomized by the sudden expansion of the steam.

The burner fits in the middle of an air register, which consists of a large annular opening surrounding



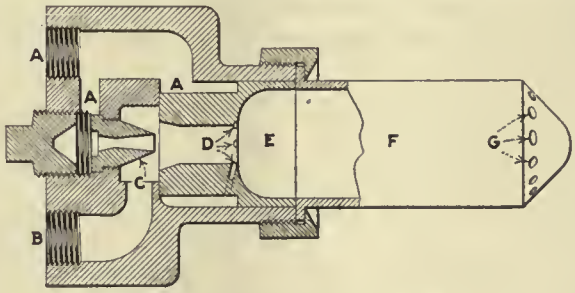
Isometric Drawing of Steam and Oil Piping in Berkshire Street Railway Power Plant



Plan and Elevation to Show Oil Piping and Oil Pumps and Oil Heater

the burner and equipped with vanes set up at an angle so as to give the air a rotary motion. Inside this is a secondary, adjustable central register, which gives the oil spray enough air to establish quick action.

Over the central burner on each boiler is installed an observation door of the "CEZ" type, to permit ready inspection of the interior of the combustion space. Each boiler is also provided with an Ellyson inclosed draft gage, placed on the front wall.



Longitudinal Section of Oil Burner

Other minor changes in the boiler setting were made, the principal one being the necessary moving of the manhole nearer to the rear, to permit the removal of soot from the soot chamber.

The Oil and Steam Piping

A 4-in. oil pipe leads underground from the storage tank, from which oil can be taken off at two levels, one 8 in. and the other 4 ft. 8 in. above the bottom. Before reaching the pumps the oil passes through strainers, of which there is one to each of the two pumps, flowing thence through one or other or both of the pumps to the single heater where its temperature is raised by means of live steam.

In the oil circuit is included a meter through which the oil can be passed if desired or the oil may be fed direct to the boiler line through a 2½-in. pipe.

The accompanying isometric drawing of the entire piping system shows the layout with conventional representation of valves, fitting flanges, etc. A detail of the piping at the pumps and heater is reproduced also in order to render the outline drawing more intelligible.

Steam for operating the pumps and heaters, and for heating the oil in the tank and tank cars, is drawn from the boiler steam line through a 3-in. pipe and is distributed as shown in the isometric drawing.

The pumping and heating equipment used in this plant is the Engineer Company's type B. The general arrangement of this set is shown by the plan and elevations reproduced. It comprises two duplex pumps, these being used rather than single piston pumps in order to insure a steady pressure of the oil. The pumps are mounted on a table carried on top of the heater, which rests upon the foundation. The drawings show, diagrammatically, the valves and the meter referred to.

In an oil-burning plant of this kind it is necessary to provide for the shutting off of the oil supply to the burners in case of blowout, fracture, leaking joints or any contingency arising to the oil discharge piping from the pumps. For this purpose in the Pittsfield plant a Foster special automatic stop and check pump governor, of the type made by the Foster Engineering Company, was placed in the main steam line to the pumps with a small line connecting it to the oil discharge lines. In the event of an accident, a sudden or abrupt drop in the oil discharge pressure would automatically cut off the steam supply to the pumps, shutting off the supply of oil to the burners.

In operation one man will regulate the oil, steam and air supply for the entire six boilers which are being equipped for oil burning. These boilers are arranged in three batteries of two each, all in one row. The boiler man will also attend to the pumps and heater which are placed in one corner of the boiler room, the corner nearest to the oil storage tank.

The 100,000-gal. storage tank is of standard construction, 33 ft. in diameter, 16 ft. high at the circumference, and 17 ft. 9 in. high at the center of the roof.

There are four courses of steel plates in the shell, successively, $\frac{3}{8}$, $\frac{7}{16}$, $\frac{1}{4}$ and $\frac{1}{4}$ in. thick from the bottom up. The roof is of No. 10 U. S. gage steel plates, supported on 6-in., 8-lb. channel rafters. The 6-in. pipe column supports the rafters at the center, the load being dis-

tributed through a crown plate of ⅜ in. steel 3 ft. 6 in. in diameter. The center column rests on a ½-in. steel plate 30 x 30 in. in size, and the bottom or floor of the tank is of ⅜ in. crown plate with ¼-in. "sketch plate." On one side of the tank is partitioned off a heating chamber in which a portion of the oil is warmed by means of a radiator of 1½-in. pipe. This is fed with steam from the boiler house through a 2½-in. line and the drip is returned in a 2-in. line. From the radiator steam line a 2-in. pipe branches off near the entrance to the tank steam coil and leads into the top of the tank for use in case of fire.

A siding from the Boston & Albany Railroad is located near the power plant. This leads onto a trestle formerly used for unloading coal cars. The trestle is 17 ft. high, so that the tank cars on this trestle can discharge oil into the storage tank by gravity. A 3-in. oil line is mounted on the trestle, which is long enough for four tank cars, although only three are actually discharged at one time. From this line a 4-in. pipe leads to the roof of the tank. The oil line on the trestle is also connected with the pumping plant through a 3-in. line, so that, as mentioned earlier, oil can be drawn direct from the tank cars and pumped to the boilers. Along the trestle is also a steam line, fed through a 2-in. pipe with live steam, to provide a means for heating the oil in the tank cars.

The engineering and construction work on this job were done by Henry R. Kent & Company, engineers, under the general supervision of P. W. Ripple, the chief engineer of power and equipment of the railway company.

Further Accomplishments of Detroit Municipal System Described

Three More of Consultant's Series of Leaflets, Which Deal with Equipment, Overhead and Transportation—How Practices of the Detroit United Railway Have Been Changed Under Municipal Operation

THREE more bulletins prepared by Walter Jackson, consultant, planned for enlightening the general public of Detroit are available. They are four-page leaflets similar to the first one, on track, abstracted in the ELECTRIC RAILWAY JOURNAL for March 3, 1923, page 371.

The second bulletin deals with the equipment taken over from the Detroit United Railway by the city. It opens with a statement that when the Department of Street Railways took over the property on May 15, 1922, pull-ins were at first more than thirty a day. A table shows the reduction from 1,857 pull-ins during last June to 916 in December. The report goes on to say: "From the foregoing figures it will be seen that in the first month of city operation it was necessary to deal with a crippled car for practically every 2,000 car-miles operated. Since the average car in Detroit makes, say, 90 miles a day, this is equivalent to the breakdown of every twenty-second car run! The importance of preventing a run-in may be gaged from the fact that a car making 90 miles a day and averaging eight revenue passengers per car-mile is serving 720 patrons who pay $36. Hundreds of car-days and the revenue corresponding thereto were lost, therefore, through sheer deterioration of equipment."

A statement of the causes of breakdowns on one route follows. Mr. Jackson continues: "While no detail records were left with the Department of Street Railways by the predecessor company, it is declared that during the first two weeks of January, 1922, the Detroit United Railway suffered an average of 195 crippled cars in a day in the shops, whereas the same, harder-weather period of 1923 shows an average of seventy-five cars a day."

MAINTENANCE COSTS COMPARED

A comparison is given of the cost of maintenance, it being stated that for June, 1922, the Connecticut Company averaged 4.28 cents per car-mile for upkeep, while for the years 1919-1921 the Detroit United Railway averaged 5.23 to 4.96 cents per car-mile. A figure by H. L. Andrews of the General Electric Company apparently for the year 1921 is given as 4.2 cents for the average of 103 city lines. In contrast with this it is stated that the Department of Street Railways in May and June averaged 3.2 cents, while by November the cost of car maintenance had fallen to 2.2 to 2.3 cents per car-mile. Mr. Jackson goes on to state: "Broadly speaking, it is generally recognized that under existing wage conditions and material costs the maintenance cost of the larger and older types of cars throughout the United States will vary between 4 and 5 cents, and that the newer large cars may be expected to cost between 2.5 and 3 cents per car-mile during their first five years at least. The performance of the Department of Street Railways is far better than these averages. The engineers' memorandum of Jan. 22, 1923, segregating the upkeep costs of cars according to old, new and one-man, as requested by your consultant, shows that the D. U. R. cars are being maintained for 2.32 cents per car-mile, while the Peter Witt cars are being maintained for only 1.46 cents per car-mile.

"The one disappointing showing is that of the one-man cars, which are costing 1.73 cents per car-mile. This compares with 1.6 cents per car-mile for forty-six months and 9,707,707 miles safety car operation by the Terre Haute, Indianapolis & Eastern Traction Company for the period Jan. 1, 1919-Oct. 31, 1922. It is true that the wages paid by the Terre Haute company were lower, but on the other hand materials must have been higher during the greater part of this period. The Detroit safeties are run chiefly in the outer or less congested territory and so need be no more subject to accident than Terre Haute cars operating in every part of that city. The Detroit cost is not high compared to other safety car operators, but it is high compared to the department's own records with the other cars, for if allowance be made for the smaller capacity of the one-man cars their maintenance on a seat basis would practically be double the figure of 1.73 cents."

The statement is made that the most creditable point is that the low maintenance costs have been obtained with a high wage scale, in proof of which rates paid by the Connecticut Company are shown in contrast, as follows:

Connecticut Company		Department of Street Railways	
		Average hourly pay of:	
Car cleaners	$0.30	Car cleaners	$0.50
Car sweepers	.345	Car sweepers	.50
Truck and motor repair	.49	Chopmen	.648
Equipment inspection	.50	Shopmen	.648
Carpenters	.52		
Machinists	.55		
Blacksmiths	.575		
Foreman's weekly wage	45.85		

Reasons for Lower Upkeep Costs

The report then goes into detail to show how the reduction in maintenance costs has been obtained. Grease cup lubrication of trolley wheels has been replaced by graphite bushings. Babbitt-lined cast-iron axle bearings have given way to solid brass bearings. Motor coils now are dipped and baked in an improved electric oven. Push-button signals are changed over from dry battery operation to the line buzzer system. Cars are being rewired for center lighting. Considerable space is given to a discussion of the merits of steel car wheels, the Department of Street Railways having adopted them in place of the cast-iron wheels formerly used.

Miscellaneous features of the shops are commended, and several details of the new car equipment are recommended for use on the older cars, such as air-operated snow scrapers, automatic brake slack adjusters and interlocking door contacts. Mr. Jackson states: "On the basis of reports from the claims division covering the period May 15-Oct. 30, 1922, the superintendent figures that the average cost of step accidents is $65 per car per annum. At a cost of $200 per car for line switches and door contacts, he figures that this expense can be cut to $10 per annum, a saving of $55, which would pay for itself in less than four years on accident costs alone, without making allowance for reduction of car-mile losses and for good will. Owing to the age of so much D. U. R. equipment he proposes to apply this safety apparatus to but 604 out of 916 D. U. R. cars. The installation of these appliances would be good business."

The storage air brake system used on the Detroit United Railway cars is severely criticised. Mr. Jackson says the D. U. R. is the one city user of storage air brakes in the United States. A check made by the department developed that "a $400 individual compressor outfit at 6 per cent interest would cost only $24 a year investment charge, compared with $66 a year attendance for the storage system, saving possibly $42 per year per car."

Regarding cars Mr. Jackson's comment is: "While the company had no modern single-truck cars, it did have 173 single-truckers, of which fifty date from 1912 and twenty-five from 1913; the rest are older. The motors on most of the younger cars are of modern type, but the cars weigh 28,750 lb. for the twenty-five twenty-eight-seat single-truckers of 1913, or 1,026 lb. per seat, and 27,700 lb. for the fifty twenty-eight-seat group of 1912, or 990 lb. per seat. On the other hand, the Municipal single-truck cars seat thirty-two and range in weight from 16,000 to 18,000 lb., or between 500 lb. and 563 lb. per seat. In brief, twice as much current is required per seated passenger in the case of the older cars." It is recommended that all of this group be retired.

It is stated that 696 double-truck passenger cars were taken over. Out of a group of 193 cars built prior to 1910 the municipal railway engineer found that nearly 100 were so badly rotted as to call for retirement. He suggested that 100 cars of this group be fitted with new trucks, air compressors, etc., at a cost of $170,000. In general, these cars average around 1,000 lb. per seat and seat forty to forty-two passengers, contrasted with the department's cars, which weigh 718 lb. per seat and seat fifty-two passengers.

The next group of 227 cars dates from 1909 onward. "Except for fifty forty-three-seat cars, weighing 37,800 lb. each, this group runs even heavier per seat than the earlier cars, namely, up to 47,100 lb. for forty-two-seaters, and with only forty-three cars running less than 1,000 lb. per seat. On the whole, these cars are not especially attractive, but as much of the equipment is fairly modern, the engineers' suggestion of spending $700 each on these two-motor cars—a total of $158,900—for compressors, safety appliances, etc., is well taken."

Mr. Jackson states that the department engineer has also recommended an outlay of $193,900 for the 280 four-motor trailer-hauling cars built in 1915 and later. These cars seat forty-six passengers and weigh 46,400 lb. or 47,100 lb. The figure given by the engineer is approximately $700 per car and will permit a more efficient use of this equipment for another ten years.

According to Mr. Jackson, "the estimates quoted total $522,800 for 607 cars, and they appear justified in view of the need for maximum car capacity with minimum outlay of new capital."

A total of 219 trailers were taken over. All seat fifty-six passengers and their weight per passenger does not exceed 500 lb. The bulletin states: "It is unfortunate that the department will be compelled to use fifty more of the same trailers, despite the unsatisfactory arch-bar truck, but this could not be avoided as the material had already been assembled and prepared before the system was taken over. However, these later trailers will at least be fitted with headlining, line-voltage buzzers, better lighting, and so forth."

In concluding, Mr. Jackson recommends that several features that promote car riding, mentioned above, should be used, such as interlocking doors, low steps, steel wheels, individual air compressors, line-voltage buzzers, better lighting, headlining and brighter interiors generally, tail-end safety lights, legible route signs and electric heaters.

A significant paragraph in the summary of the report is, "No electric railway can be expected to purchase new cars out of earnings. Additional facilities imply new capital. It is entirely up to Detroit's citizens whether they will travel in cars that are efficient, safe and attractive or be carried in vehicles that are out of place in a genuine metropolis."

Overhead Practices

Bulletin No. 3 deals with the overhead division. Mr. Jackson makes statements indorsing the work of the Municipal Street Railway engineers, which are covered in the summary of the report following:

The overhead trolley wire as taken over was so badly worn that trolley wheels could not stay on the wire or give even, long-life wear. At first the line division had to deal with the unheard of average of ten wire breakages a day, the total for the period May 15-Dec. 31, 1922, running to the staggering sum of 1,400. The worst feature of this dangerous deterioration of the current-carrying wire was the delays caused to hundreds of thousands of car patrons and

the loss of many thousands of dollars in revenue that would otherwise have been attracted.

It may have been excusable to stop spending money for new wire during the period of purchase negotiations, but it was inexcusable to leave no records of wear, since these records would have enabled the line division to replace most of the over-worn wire before instead of after breakage.

Perhaps the most glaring defect of the Detroit United line practice was that it had almost no long-life trolley wire in use at busy, hard-service locations, although such wire is common practice almost everywhere. On the other hand, the Detroit United seems to have enjoyed the doubtful honor of having more steel trolley wire—40 miles—than any other large electric railway system in America.

The Department of Street Railways has adopted alloy wire at least for curves and other special work, but it has a long way to go before it will be anywhere near the best practice. Such heavy lines as Woodward and Jefferson with all-day train service should be in alloy wire from end to end, so that the period between replacements can be doubled and possibly tripled.

In the other features of its line construction the Department of Street Railways has not only advanced over Detroit United practice but can show its heels to nearly all other electric railways. For example, preservative treatments that will protect wooden poles against rot and steel poles against corrosion have been adopted throughout in spite of the temptation to make a showing of seeming economy in first cost. The line division also used the specifications of the American Electric Railway Engineering Association wherever they were good enough, but for some items like cables, where safety was first, and for railroad crossings, where wire repair is doubly troublesome, higher standards were applied.

The Department of Street Railways seems to have been the first railway in America to dig pole holes by machine, and now that there is little construction, it has been business-like enough to sell one machine and rent the other, instead of having them rust in idleness.

Transportation Practices

Mr. Jackson's fourth bulletin deals with the transportation division of the Municipal Railway. After speaking of the lowered morale under the D. U. R. management, Mr. Jackson states that the car men now appreciate that their relationship to the community is on a better and higher plane than before. With regard to the increase in wages, he states: "It is hardly necessary to go into a detailed comparison of the preceding and present scales. This comparison would bring out the net result that in September, 1922, under the old scale, there were operated 733,053 car-hours for $436,430, which yields an average pay of 59 cents an hour, while in December the payroll for 795,198 car-hours was $499,338, or 62.8 cents per hour, an increase of about 6.4 per cent."

Regarding the wage scale, Mr. Jackson states: "The main features of the payroll change were the abandonment of the 55-58-60 cent scale for men working three, six and nine months, respectively, in favor of a per diem plan granting $4.50 for eight hours during the first three months, $4.75 for the next nine months, and $5 thereafter. To these daily wages a bonus of 40 cents, or five cents an hour, is added for safety car operation. The overtime pay has been simplified by adding enough to make a flat 75 cents an hour regardless of the eight-hour rate instead of figuring one and one-quarter time for weekdays and one and one-half time for Sundays. Operators on 'owl' safeties get 80 cents; on other 'owls,' 75 cents."

Mr. Jackson states that the conditions for recruits have been greatly improved, as a man now receives $2 a day as soon as assigned to a breaking in on a specific line, and $80 a month minimum instead of $9.25 a week minimum when assigned to the extra list.

With regard to schedules, Mr. Jackson states that an examination of the schedule used by the Department of Street Railways showed that advantage has been taken of the best thought of the industry, although the D. U. R. had already adopted a practice that its successor could retain. He says that no exact figures are available to make a comparison between the Municipal Railway schedule and the Detroit United schedule. As an example, Mr. Jackson cites the present schedule on Woodward Avenue as effective on weekdays, commencing Jan. 24, 1923. On this line trains run through the entire operating day (forty-six-seat motor and fifty-six-seat trailer), but the fluctuations of service call for a variation in headways from four minutes in the off hours to one minute in the rush. The exact schedule as analyzed by Mr. Jackson is as follows: "To meet these variations, we find that out of 114 runs, only the men on forty runs had what is termed a 'straight run,' namely, one that is uninterrupted over a platform-duty period ranging from eight hours to nine hours and twenty-two minutes. On the other hand, only sixteen runs were of the unpleasant three-piece variety, which means that the platform man had two breaks in his working day, as in Run No. 160, where the schedule called for the following:

On 7:53 a.m.—off 9:23 a.m.
On 12:40 p.m.—off 2:10 p.m.
On 2:26 p.m.—off 7:28 p.m.

"This crew spent only eight hours and eighteen minutes on duty, but this was sufficient to make use of them in both the morning and evening office peaks. The elapsed time, namely, 7:53 a.m. to 7:28 p.m., is eleven hours and thirty-five minutes. Crews are paid only for actual time on the platform plus ten minutes for make-ready and reporting time, this allowance being the same whether the runs are straight, two-piece or three-piece. Only one or two runs on the schedule show more than thirteen hours elapsed time. On the other hand, only four runs (extras) show less than eight hours, and it is even possible that they made up a full day's work elsewhere. All of this indicates that the labor power available is being used efficiently, humanely and with minimum outlay for overtime and bonus rates."

Mr. Jackson states that the practice of allowing a week's vacation with pay, which previously was confined to supervisory officials like inspectors, has been extended by the Department of Street Railways to the platform men as well. He thinks this should be highly popular with the men, and also states that vacations with pay are common practice on the municipal tramways of Great Britain.

Regarding discipline, it is stated that no man may be discharged until found guilty by a trial board, the chairman of which is the general manager or assistant general manager, the other members being any two department heads designated by the chairman, and either the superintendent of transportation or the assistant superintendent of transportation. The testimony is prepared by the chief of the intelligence bureau, due notice being given by letter to the defendant. Should he waive appearance he is asked to present his resignation. Full publicity is given to the results of the trial board hearings by means of carhouse bulletins. Thus the men learn the punishment meted out.

Mr. Jackson states that the rate of turnover is generally a pretty fair indication of the satisfaction of the men. "The turnover has been only 3 or 4 per cent a month as shown by the following data:

ON AND OFF RECORD OF EMPLOYEES IN TRANSPORTATION DEPARTMENT

Year 1922	December	November	October
Total employed	3,255	3,218	3,167
Resigned	120	108	105
Qualified for service	319	184	102

"The increase in the number of men qualified for service indicates the efforts being made to fulfill traffic requirements, although cars as well as men are essential for that purpose."

It is stated that an undue number of accidents has occurred with the new or faster accelerating equipment. Mr. Jackson says that it is not uncommon during the first year of such operation to have an exceptional number of accidents, because the car operators are overconfident in the braking ability of the rolling stock. In this connection Mr. Jackson says: "Likely enough, the manufacturers will be glad to send some one without cost to the department. Communications on the subject might be made to Carl H. Beck, manager New York office Westinghouse Traction Brake Company, and to H. L. Andrews and J. C. Thirlwall, railway department General Electric Company, Schenectady, N. Y. These three gentlemen have had exceptional experience with safety car operation and can give valuable aid."

Another reason for the undue number of accidents with safety cars is stated to be that they are operated on lines for which they were not intended. This has been done because the outlying lines which were planned by the Municipal Railway for safety car operation have not all been constructed, so that the safety cars are being used on congested lines for much heavier service. It is said a power-saving campaign would also help in cutting down accidents, because the motorman who saves power is the motorman who has his car under best control.

Considerable space is taken in criticism of the use of the single-end cars on the Detroit United. Mr. Jackson states: "One would suppose that street cars suffered disability enough in being obliged to stick to a rail, but quite a large school of electric railway operators did not think so because they deliberately crippled the flexibility of their railways by adopting what is termed the 'single-end car,' but which might more appropriately be called the 'one-armed car.' The chief excuse was simply to save a few hundred dollars per car in first cost by omitting one controller, one engineer's valve, one circuit breaker, etc. Most of this saving was offset by the price of the lots necessary for loops on which to turn these one-armed cars quickly. It is possible to turn such cars on a 'Y,' but this calls for a piece of track up a side street and necessitates the blocking of traffic. The one-armed car obsession was strongest in the central states, and the Detroit United was one of the victims."

After giving specific instances of where turn-back facilities are not provided for the single-end cars within reasonable distances, Mr. Jackson states that he recommends the installation of crossovers wherever necessary and the exclusive use of double-end cars.

Mr. Jackson states that the Department of Street Railways is making an effort to get more work out of the cars by using them for initial or final runs on other than their regular routes. A car assigned to some specific route may make a trip before its regular run in the morning or after its regular run in the evening on some other route, in this way turning quite a lot of deadhead mileage into revenue mileage. He goes on to give specific examples of where this is being done.

As a result of this practice the transportation department is not in possession of accurate records as to car mileage. Mr. Jackson states: "Because of these and other changes in routing, the transportation division does not try to base its mileage records on reports from conductors' trip sheets. The mileage is figured directly from the schedules, subject to such addition or subtraction as determined from reports of the traffic inspectors to station masters. On more stabilized railways, it is possible to get a fairly accurate check from the conductors' trip sheets, especially if a system of symbols is used to distinguish standard turn-backs from regular full-length runs. This does not seem practicable at the moment on the Detroit lines."

Mr. Jackson suggests that it may be possible to improve car-loading conditions by the installation of loading platforms at various points, such as the Ford plant in Highland Park and the new plant at River Rouge. The intersection of Milwaukee Avenue and Chene Street is considered possibly the worst loading point, because least controlled. Prepayment areas and shelters are recommended for Cadillac Square. Mr. Jackson says: "It may be mentioned here that in European cities neat, glazed shelters for the street railway passenger are no novelty. A number have also been built in the United States. They are an excellent advertisement for the service and sometimes may be a source of revenue through news-stand concessions."

According to Mr. Jackson a standard feature of an up-to-date transportation department is a traffic-checking bureau. "Such a bureau keeps in constant touch with the larger employers of labor to learn of the number of people employed and their on and off periods; makes periodical surveys of different lines to see whether too much or too little service is being given, and also takes note of any obstructions to the quickest handling of passengers, whether these be hindrances along the line or in the loading arrangements at terminals or on the cars themselves."

It is stated that in Detroit there are now five men in the schedule department employed as traffic checkers, but who at present are not giving their time to this work. Outside of this staff the transportation division must depend almost solely upon the free lance operations of the supervisor of traffic, who is assisted partly by the assistant superintendent of transportation.

Mr. Jackson says that the traffic bureau has not yet assumed the importance it deserves on a system that is growing so tremendously. He says: "The force is too small even if it could be constantly employed in traffic check operations, which is not the case as we have seen. The work ought to be carried to at least the point where the superintendent of transportation will have before him seat-use graphs of different hours of the day on various lines. These graphs with their evidence of tremendous changes in volume of traffic during short periods may prove of more educational value than heaps of figures, both to the railway management and the railway customers."

Mr. Jackson says that the cars should be designed for either the pay-as-you-enter or pay-as-you-leave system of fare collection. He states specifically: "Any one can see the wonderful advantage of the present pay-leave cars where heavy loading is concerned. However, it is also true that Detroit has such a medley of loading and discharging areas that the car which loads fastest would not also be the car which discharged fastest when reaching some heavy crosstown point

where half or more of the passengers wished to transfer. This is not so noticeable in comparing the Peter Witt car with the Detroit United kinds, but it would be more apparent if the Peter Witt had to bear comparison with a double-end car having ample flexibility to meet either pay-leave or pay-enter conditions. It is because of the importance of crosstown traffic in Detroit that thought should be given to a modification of the Peter Witt car that will permit both prepayment and postpayment at will according to the character of operation. The same flexibility should apply to all future train units excepting the trailers in hand."

Mr. Jackson says that Detroit has practically the lowest fare in the country, the rate being five cents cash and 1 cent for the initial transfer. To quote him:

This 5-cent fare is a wonderful help in handling traffic contrasted with what happens with the 7-cent, 8-cent and 9-cent fares in other large cities. The chief element of delay is introduced, first, by the necessity for a transfer by one-third of the cash riders; second, by the stopping to pay for said transfer. The cash rider has the exact fare to a considerable extent and need only drop his nickel in the box and pass in or out as the case may be. The transfer user must stop for a cash-in-hand transaction, often involving change-making because of the penny.

The department has liberalized the use of the transfer compared with the D. U. R. scale just preceding under which the free transfer on a transfer was limited to portions of the Grand Belt and Crosstown lines. What, now, is the true fare? Under the popular way used to figure average fares, namely, on the basis of fare per car, Detroit could claim a fare of 3.86 cents! Here's why:

"Out of 100 passengers counted as individuals—

Suppose sixty-seven pay 5 cents each, or	$3.35 for 67 single-car rides
Suppose twenty-eight pay 6 cents each, but are counted twice because they ride on two different cars, giving	$1.68 for 56 single-car rides
Suppose five pay 6 cents each, but are counted thrice because they ride on three different cars, giving	$0.30 for 15 single-car rides
Or	$5.33 for 138 rides = 3.86 cents a ride

The true average fare is as the rider sees it. In that case, we figure 67 per cent at 5 cents and 33 at 6 cents, making the average fare 5.33 cents. This is the lowest universal-transfer fare in the United States for the area covered with the possible exception of Cleveland under a similar scale.

Mr. Jackson says that like most properties in the central states, the Detroit lines have a majority of locked boxes for fares—a heritage from the days when cut-rate paper tickets were used. He says that no attempt is made to secure a check of box contents by means of overhead registers, although such registers were installed on all safety cars. However, he says that the use of a register for double-checking is of questionable value on a busy line where it is practically impossible for the conductor or operator to comply with the old-time rule that each fare must be rung up as collected. "Because of the non-use of registers all but a few multi-fare cars are entirely free from the annoying tintinnabulation of the fare register. It is to be hoped that the equally obsolete cord and bell signals will also be replaced by automatic door signal lights in the near future. Noise on a street car need no longer be taken as a matter of course."

The remainder of the bulletin is taken up with the subject of the weekly pass, as applied to Detroit. Mr. Jackson goes into the matter in some detail. This form of pass has been described in various issues of the ELECTRIC RAILWAY JOURNAL. He gives no figures for the recommended charge for the pass, but states: "The whole subject of the pass has so many aspects that it deserves a special detailed inquiry so that the department would have full light before deciding to try or reject this plan."

The Readers' Forum

Can Theft of Electric Light Bulbs Be Prevented?

Blankburgh, March 13, 1923.

To the Editors:

We are constantly annoyed by the loss of electric light bulbs from our cars. At night we have to keep a large number of the cars in open storage yards which are readily accessible to the public. Apparently some persons are making a practice of entering the cars under cover of darkness and stealing quantities of lamps. The car cleaners and others working around the yard at night have been instructed to watch for these thieves, but have been unable to prevent the stealing.

At one time it was our custom to have the name of the company etched in the glass of the bulbs. We thought that this might act as a deterrent to those who contemplated stealing them, but apparently it did not, for they were taken just the same. It has been suggested to us that we use a device to lock the bulb into the socket, but that scheme seems to present some difficulties. It has been further suggested that we use a socket of different size from the ordinary commercial socket, but it would be a very expensive thing to change the size of the fixtures in all of our cars.

At present we are put to no little inconvenience and expense to replace the lights that are stolen. I would be glad to hear what others are doing to prevent the theft of electric light bulbs. Has any one discovered a satisfactory solution of this problem? "EXECUTIVE."

Traffic Congestion in Newark

STATE OF NEW JERSEY
BOARD OF PUBLIC UTILITY COMMISSIONERS

NEWARK, March 6, 1923.

To the Editors:

The article entitled "Traffic Congestion Worries Newark" and more particularly your editorial entitled "Street Congestion Aiding Solution of Newark's Traffic Problem," in the issue of the JOURNAL for March 3, 1923, were read by the undersigned with much interest.

Reference to your files will disclose that your issue of Feb. 26, 1921, contained an article entitled "Commission Studies Newark Traffic." This was a rather lengthy abstract of a report by inspectors of the Board of Public Utility Commissioners, State of New Jersey, on street car and vehicular congestion in the center of Newark, and dated Nov. 19, 1920. This report contained several plates and maps showing the car flow during rush hours on all streets traversed by street railways in the congested section of the city. Several of these plates were reproduced with the published article. This report was drawn up following a detailed study of traffic conditions in the center of the city of Newark, particularly regarding street car traffic, and demonstrated through the medium of detailed data that the congestion of cars and vehicles on Broad and Market Streets was even then a serious matter. The utilization of other streets for routing street cars and vehicles was suggested and emphasized in the report as being necessary in order to relieve the existing congestion of traffic of every character in the main business section of the city.

During the two years and more which have elapsed since this investigation was made there has been a steady increase in traffic, particularly vehicular traffic.

While the routing of motor buses and possibly some other vehicles on streets other than Broad and Market Streets would undoubtedly reduce the existing general traffic congestion on these thoroughfares, greatly reduced street car congestion on these streets, with its resultant delays, can never be obtained until certain rerouting of street cars, necessitating also the construction of certain track connections, has been accomplished. None of the suggestions contained in the report hereinbefore referred to have been adopted to date.

H. C. EDDY, Street Railway Engineer.

Economical Elevated Railway Construction in Brooklyn

BROOKLYN RAPID TRANSIT SYSTEM
BROOKLYN, N. Y., March 20, 1923.

To the Editors:

In the issue of the ELECTRIC RAILWAY JOURNAL for Jan. 6, 1923, page 3, was an editorial in which cost data were quoted to show that two-track or three-track elevated structure costs about $1,000,000 per mile.

Engineers familiar with the construction have recently been making some compilations of costs on the Jamaica Avenue extension, in Brooklyn, completed in 1919, and the Liberty Avenue extension, completed in 1916. It appears that these extensions were built at a cost of less than $1,000,000 per mile. Following are partial costs of this work:

SUMMARY OF COST DATA ON ELEVATED RAILWAY TRACK STRUCTURES

Jamaica Avenue Extension	
Three-track structure with two tracks built.	
Cost per foot of structure (without stations)	$75.79
Cost of structure per foot of single track (without stations)	35.16
Average cost per station (twelve stations)	53,474.00
Cost per mile of structure, without stations	403,000.00
Cost per mile of structure, including stations	545,000.00
Liberty Avenue Extension	
Three-track structure with three tracks built:	
Cost per foot of structure without stations	$80.95
Cost per foot of single track without stations	27.52
Average cost per station, (six stations)	62,356.00
Cost per mile of structure, no stations	427,500 00
Cost per mile of structure, including stations	603,700.00

The length of the Jamaica Avenue extension was 4.5 miles and that of the Liberty Avenue extension, 2.1 miles.

Following are the data in more detail: The Jamaica Avenue extension consists of two tracks generally, with foundations, columns and transverse girders designed for three tracks. The exact length of structure is 23,913 ft., and that of single track, 51,532 ft. The costs per lineal foot of structure and of track were:

	Cost Per Lineal Foot Structure	Cost Per Lineal Foot Single Track
For foundation, steel structure and shifting wires, clearing other public service lines	$56.69	$26.28
For track—special trackwork, footwalks, railings, signal towers and interlocking third rail, remote control, structure and track bonding	19.10	8.88
Grand totals	$75 79	$35 16

These costs do not include land damage, engineering, interest, legal expense, or storeroom expense.

The Liberty Avenue extension comprises 11,040 lin.ft. of structure and 32,450 lin.ft. of single track, and consists of three tracks throughout. The detail costs were:

	Cost Per Lineal Foot Structure	Cost Per Lineal Foot Single Track
Foundations, structure, clearing wires	$62.03	$21.09
Track, special trackwork, guard rail, footwalks, interlocking third-rail bonds, structure bonds	18.92	6.43
Grand totals	$80 95	$27.52

As above these costs do not include land damage, engineering, interest, legal expense or storeroom expense.

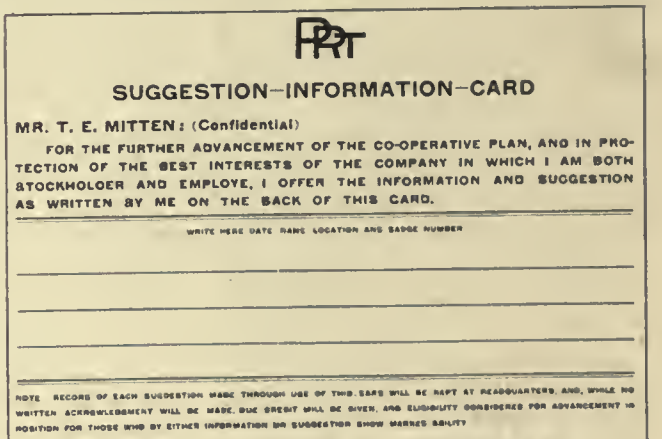
These figures show that the cost for the complete three-track structure referred to is but 7 per cent greater than the structure all ready for three tracks but without the longitudinal girders for the three tracks. The track proper shows a proportionate increase in cost about equal to the increase in number of tracks, that is, 30 per cent. These structures are of the regular deck girder type calling for open-track construction without ballast. This type of structure was selected primarily because it obstructs the light the least, which is an important factor in such construction on comparatively narrow streets with fairly tall buildings. Furthermore, three tracks are provided, or may be, so that an express service may be maintained as desired. The Brooklyn structures may be classed as utilitarian, without much attempt at beauty or noise prevention. The idea was to get a structure which could be extended quickly and as far as possible for a given sum.

R. C. CRAM,
Engineer of Surface Roadway.

Taking Employees' Suggestions Seriously

BEGINNING with 1923 suggestions made by employees of the Philadelphia Rapid Transit Company have been addressed to "T. E. Mitten, Personal," and they are given his personal and confidential analysis. While their receipt is not acknowledged the men understand that each suggestion is carefully considered and that due record is made which may affect promotions. Quite a feature is made of this.

In calling the attention of the men to the function of the "suggestion-information card," the company


PRT

SUGGESTION—INFORMATION—CARD

MR. T. E. MITTEN: (Confidential)

FOR THE FURTHER ADVANCEMENT OF THE CO-OPERATIVE PLAN, AND IN PROTECTION OF THE BEST INTERESTS OF THE COMPANY IN WHICH I AM BOTH STOCKHOLDER AND EMPLOYE, I OFFER THE INFORMATION AND SUGGESTION AS WRITTEN BY ME ON THE BACK OF THIS CARD.

WRITE HERE DATE NAME LOCATION AND BADGE NUMBER

NOTE RECORD OF EACH SUGGESTION MADE THROUGH USE OF THIS CARD WILL BE KEPT AT HEADQUARTERS AND, WHILE NO WRITTEN ACKNOWLEDGMENT WILL BE MADE, DUE CREDIT WILL BE GIVEN, AND ELIGIBILITY CONSIDERED FOR ADVANCEMENT TO POSITION FOR THOSE WHO BY EITHER INFORMATION OR SUGGESTION SHOW MARKED ABILITY

(over)

1923 Suggestion Card Used by Philadelphia Rapid Transit Company. Reverse Side Is Ruled for Suggestions

points out that a better knowledge of what the management desires of the men, a better realization of their new duties as employee-owners and increased confidence that their suggestions will be seriously considered will make the suggestion card a source of inestimable advantage to all concerned. Reports as to shortcomings in car operation, car and track inspection, power supply, signal operation, etc., with suggestions for betterment in practice or procedure, are strongly encouraged from every employee of the company.

Association News & Discussions

Illinois Association Holds Third Joint Convention

Executive Problems, Highway Construction and Inventory Methods Hold Interest of Railway Men—Education and Public Relations Were Subjects of Joint Sessions Held with State Gas and Electric Associations

THE Illinois Electric Railway Association held its fourteenth annual meeting in Chicago on March 14 and 15. Joint meetings with the Illinois gas and Illinois electric associations were held in the forenoon of each day, while a joint banquet was held Wednesday evening. At the general session on the morning of March 14 Charles M. Thompson, Dean College of Commerce and Administration, University of Illinois, and Ralph E. Heilman, Dean Northwestern University School of Commerce, spoke on the subject of "Public Utility Education at the University." Dean Thompson invited the association to co-operate in the preparation of an outline for a curriculum for a public utility course at the University of Illinois. He gave in a general way what had been accomplished in the training of students for the public utility business. He pointed out that the men graduated from this course would be trained business men and have some training in technical subjects bearing directly on public utility companies. They would not be engineers, but would have just enough engineering to understand the blueprints. In other words, they would have descriptive engineering; they would also have a conception of the history of the public utility business.

Dean Heilman, speaking in his characteristic, forceful manner, explained why it was necessary to have a course of public relations. The present course in business training is not sufficient because a public utility is different from a large privately owned corporation. The policies of management are different because they might not fit into government regulations. He explained that the results derived from such an educational program would tend to professionalize the utility business, produce respect and cultivate a scientific attitude. In the discussion Britton I. Budd, Chicago Elevated Railroads, read a few notes on personnel and training and development of the young man. He referred to the common case where the young man has been misplaced and the young man discredited or lost from the service. This misfit circumstance has in a large measure been eliminated on the elevated lines by placing an official as sponsor for each young student engineer to see that he finds his niche.

The development of the Mazda lamp was the subject of F. T. Benson, General Electric Company, at the banquet held Wednesday evening. He introduced the new 30,000-watt lamp to the audience. In the large banquet room the lamp gave an illumination like sunlight. It had to be cooled with an electric fan. Britton I. Budd acted as toastmaster.

ELECTRIC RAILWAY SESSION

Stanley P. Farwell, Bureau of Commercial Economics, was the first speaker of the Wednesday afternoon session. His subject, "Stores and Inventory Methods," proved very interesting and brought out the necessity for adequate stores department methods and for an inventory either yearly or monthly. Mr. Farwell's paper, which is abstracted elsewhere in this issue, was discussed by W. H. Sawyer, president East St. Louis & Suburban Railway. He pointed out that a yearly inventory was somewhat of a "bugbear" to him and that he had replaced this operation with a more simple form known as a continuous inventory. The entire stock was divided into twelve groups and one group was inventoried each month. This required only the storekeeper and assistant and one from the auditing department to make such an inventory.

Mr. Sawyer's paper on "Electric Railway Executive's Problems" was the next one to be presented at the first afternoon session. An abstract of it is printed elsewhere in this issue. Following Mr. Sawyer's paper, a discussion was held on buses and the relation between bus transportation and street railway transportation. Mr. Sawyer said he believed the place for the bus is where the street car man puts it. Responsibility for service in any community rests with the railway company, as its business is to serve the public. He pointed out that buses are merely a temporary means of transportation where it is impossible to secure the money to lay track. While the operation may be a little more expensive, there is not as great an initial cost.

F. E. Fisher, general manager Chicago, Ottawa & Peoria Railway, questioned Mr. Sawyer about the bus competition on an interurban railway where the interurban was paralleled for its entire length by a concrete highway. Mr. Sawyer, replying, said that the competition on the concrete highway should be only private automobiles and not buses. Continuing, he said that the interurban is now coming into its own and it must either improve the service or scrap the equipment, as the Illinois Commissioners had been very fair in denying licenses to buses. J. R. Blackhall, general manager of the Chicago & Joliet Electric Railway, discussing the subject of buses, stated that although his road had a concrete highway running parallel to it the entire distance from Chicago to Joliet, it had not been troubled with bus competition. This was due to the co-operation on the part of the officials of municipalities through which the railway and the highway pass in refusing to allow buses to operate. Mr. Blackhall is now operating a bus line from Rockford to Stateville, the new penitentiary location, the fare being 15 cents and the distance 2½ miles. He agreed with Mr. Sawyer that the railway company must operate all transportation facilities.

"Advantages of Americanization of Railway Employees," by C. B. Goodsell, educational director Chicago, North Shore & Milwaukee Railroad, was the last paper on the first afternoon session. He summed up the results obtained from this work as follows:

"What can we say about the results of this work? First, we believe there is a marked improvement in the ability of these men to understand English and to talk it and with this has surely come less misunderstanding, mistakes and accidents. Our safety meetings certainly mean more to these men and our foremen have made marked improvement in their written reports, both in accuracy and legibility. Living conditions in the section houses have shown a marked improvement and a real pride in keeping the surroundings attractive is noticeable.

"Perhaps the greatest change has come in the better spirit which is shown by these men—a better spirit toward America, toward the men over them and toward the company. This is something which cannot be measured with a tape line but which nevertheless produces contentment and efficiency. A man's birthplace has little to do with his spirit, but his surroundings and the treatment he gets have much. We are trying to treat these men as we would the higher type of men which we want them to be. If you treat them as 'hunkeys' they will be little more. If you treat them as 'coming Americans' they will measure up. Perhaps not 100 per cent, but fully as well as the average American."

This Americanization work on the North Shore Line was treated at length in ELECTRIC RAILWAY JOURNAL, issue of Aug. 27, 1921, page 332, and issue of March 3, 1923, page 373.

B. J. Mullaney, director Illinois Committee on Public Utility Information, described the work of his committee at the general session Thursday morning. He pointed out that where four years ago there was no such committee, now eighteen states have similar organizations. The object has been to give the newspapers the information that a utility has something to print. An idea of the results obtained by the committee was given by Mr. Mullaney. He stated that up to the present time 106,000 column inches, which is equivalent to 1,000 pages of newspaper space, had been printed in the newspapers of Illinois in the last four years. The committee had distributed 8,000,000 pieces of literature, of which 56,000 pamphlets had gone to high schools and were used in the instruction of high school students. The results or consequences of the work of this committee were beneficial to all utility companies. Where, in the 1919 Legislature, twenty bills were introduced hostile to public utilities, and had to be handled at considerable expense to the utilities, not a single bill was introduced in the 1922 session of the Legislature. He pointed out that something must have happened, and this could only be attributed to information distributed by his committee.

A paper by Walter Jackson entitled "The Sale of the Ride" was read at the second afternoon session of the electric railway section. Discussing Mr. Jackson's paper, C. E. Thompson pointed out that where competitive lines operate in a city the pass can be used to advantage on the line which covers the major downtown district, the pass being used to create an off-peak load.

A paper by C. E. Thompson, printed elsewhere in this issue, emphasized the fact that it is not only necessary to sell the ride, but is equally important to keep it sold. It was his opinion that the car builders were building interurban cars far too light, with large seating capacity, and eliminating to a large extent the comfort which should be derived from interurban travel. L. E. Gould, Economy Electric Devices Company, substantiating remarks made in Mr. Thompson's paper, stated that the power required to operate a large interurban car is little in excess of that required to operate the new present light-weight interurban cars. The saving derived from this source he felt did not offset the desirability of selling the patrons of the line something more than mere transportation.

Clifford C. Older, State Highway Engineer of Illinois, spoke on "Highway Construction Required to Meet Modern Road Traffic Conditions." The discussion that followed Mr. Older's paper served to indicate the weakness of present railway paving construction. Mr. Tinnon, engineer maintenance of way Chicago & Joliet Electric Railway, stated that the present method of paving between and around the tracks is not good. He said it was as though the companies were throwing their money in a well. With a permissible wheel load on trucks of 16,000 lb., the paving in between the tracks soon looks like a washboard, although the track itself is in perfect alignment. The load has been too much for the tie and the spikes cannot be expected to hold the tie up against the rail. In his opinion the only solution is to perfect a pavement which will support the load in the surface. He suggested that a 6-in. concrete slab surface might possibly carry this load. However, the objections to use of concrete at the surface have been voiced by municipalities because of the noise.

F. E. Fisher expressed himself as being opposed to laying the rail in solid concrete and voiced his disapproval of a substitute tie. He suggested that it might be possible to have a sub-slab underneath the tie and asked Mr. Older if such a piece of roadbed would be prepared by the State of Illinois. Mr. Older replied that the state engineering department would be willing to undertake the construction of an ideal track if the appropriation was made by the utility commissioners.

At the close of this session the following officers were elected: Arthur D. Mackie, Springfield, president; R. A. Moore, Joliet, first vice-president; J. F. Egolf, second vice-president; R. V. Prather, Springfield, secretary and treasurer. The executive committee remains the same with the exception of W. L. Arnold, whose place is taken by J. H. McClure, vice-president and general manager Chicago, Aurora & Elgin Railroad.

Training Young Engineers in Utility Work*

BY BRITTON I. BUDD
President Chicago Elevated Railways

AFTER a young man has completed his education and entered the employ of one of our public utility corporations it is of the utmost importance that we train and develop him so that he will become interested in his work and want to remain in the employ of the company. In the past many college men have entered the employ of utility companies after graduation, worked one or two years and then resigned to accept positions in other lines of work. Their time has been more or less wasted and the company has lost the amount of money invested in their preliminary training. This has been due to the fact that the young men have been placed in some department and left there without any official of the company being held responsible for their training or advancement.

The utility companies need young men specially trained in various phases of the business. It is just as essential to develop the personnel of the organization as it is to develop the physical property. If the utility companies are to draw the best men graduating from our universities into their organizations, they must offer them the same advantages and inducements as are offered by the big manufacturing concerns throughout the country. It is essential that some executive official be made responsible for the training of these young men for a certain period or until they work into a permanent place in the organization. The young men should be changed from one department to another until they get a general insight into the business as a whole and their salaries should be increased from time to time. Special care should be exercised by foremen or heads of departments to explain the technical details and reasons for doing things in a certain way. The supervising executive should interview these students frequently in regard to their work and give them a chance to offer suggestions. He should also make the young men understand that they are at liberty to come to him at any time in regard to matters in connection with their work or their personal affairs.

The supervising executive must keep these students interested in their work and develop this interest to the point where they will want to make the utility business their life work. A man who is simply working because he must and has no particular interest in his position certainly will not do as well and will not advance as fast as the man who has become thoroughly interested in the work he is doing and in the welfare and success of the company for which he is working. When these students become interested and feel that there is a future for them, they will induce other young men who are about to finish at the universities to enter the employ of the company for which they are working. The young man about to graduate will ask his friend who has been out of school a year or two questions such as, How are you getting along? Do you like your work? How much money are you making? and What are your chances for advancement? If his friend answers these questions satisfactorily, he will want to identify himself with the same organization and before long positions in that organization will be greatly sought after.

An electric railroad with which I am familiar has been working along this line for several years and one or two examples taken from their experience will suffice to illustrate my point:

*Discussion presented before joint meeting of Illinois electric railway, electric and gas associations, Chicago, March 14, 1923.

A graduate of the School of Electrical Engineering, Iowa University, class of 1917, was employed April, 1919, after being discharged from the U. S. Army as a second lieutenant, Signal Corps. He was placed in

the electrical engineer's office and assigned to valuation work. His salary was fixed at $125 per month. In January, 1920, he was assigned general work in this department such as drafting, laying out wiring and conduit and obtaining material for conatruction work. At this time his salary was increased to $140 per month. During the next six months he broke in as a power supervisor and his salary was increased to $180 per month, on June 1, 1920. He haa shown a special inciination for the work in the electrical department and has been definiteiy assigned to this department.

A graduate of the School of Electrical Engineering, University of Illinois, ciaas of 1920, was employed June 19, 1920, and placed in the electrical engineer's office. He was assigned to valuation work and his salary fixed at $125 per month. After finishing the valuation work in November, 1920, he waa given miscellaneous work in this department such as the pianning of repair work and new construction work. On July 1, 1921, his rate was increased to $135 per month. In January, 1922, he was transferred from the electricai engineer's office to the shop department, assigned to miscellaneous engineering work, consisting of drafting, inspections, reports and the specification of material in connection with the maintenance and reconstruction of roliing stock. On June 1, 1922, his salary was increased to $160 per month. On September 1, 1922, he was transferred to the accounting department and placed in a special position requiring engineering knowiedge and also some knowledge in accounting. When assigned to this work his salary was increased to $200 per month.

Manufacture of Electric Railway Equipment*

Comfort and Convenience of the Passengers Is Primary Consideration, and Light Weight and Other Economizing Measures Are Entirely Secondary

By C. E. THOMPSON
Assistant to the President,
Chicago, North Shore & Milwaukee Railroad, Highwood, Ill.

DURING the past few years volumes have been written dealing with the condition of the electric railway industry, and many and varied reasons have been advanced for the falling off in traffic and the lack of financial return. What has the manufacturer of railway equipment done to help the situation? What improvements have been made to add to the attractiveness of travel by street railway and interurban lines? Your answer is, probably, "little or nothing."

The tendency has been to reduce the cost of manufacture, to reduce the weight of equipment, to increase the seating capacity, to decrease the cost of operation—all at the sacrifice of comfort, convenience and appearance. Hard slat seats with straight backs, set so close together that knee room is lacking; springs so light that when car is loaded the body rides on the axle; maybe longitudinal seats, that more standing room may be provided; light-weight interurban cars operated at high speed over poorly maintained tracks. Why?

Because they can be manufactured at less cost and operated more cheaply. So many properties have operated cars so weatherbeaten and "down-at-the-heel" looking that it is a wonder the industry is not in worse repute than it is. And then, too, often the passenger is annoyed by noisy gears, dragging brake shoes, windows that rattle, body squeaks, lack of heat and poor ventilation. The manager who wants cars which provide for the comfort of his passengers must sell his ideas to the manufacturer and pay the extra cost of having his equipment built special.

Electric railway operators have too often taken the wrong view when traffic fell off due to increased rates or other causes. They attempted to meet the situation by reducing operating costs, by curtailing service, by using lighter equipment, by deferring maintenance and in many other ways—most, if not all, of which caused further decrease in riding and added to the feeling that the rates were too high. The cost of moving a ton 1 mile and the saving in operating costs per annum for each ton that could be eliminated from the weight of a car was once given great publicity, and many were the advocates of minimum-weight cars for all classes of service without regard for the comfort of passengers. Some eight years ago we were ordering our first lot of steel interurban cars. Our engineers designed a car weighing about 45 tons. Some car builders took the plans and showed us by nicely prepared exhibits and by somewhat convincing arguments that we should use for the contemplated service a car weighing between 30 and 35 tons. We took the position that a light-weight car operated at a speed of 65 or 70 miles per hour would not provide comfortable riding qualities, and that increased patronage was more to be desired than low operating costs. We were severely criticised by many and pitied by not a few for our lack of experience and vision, but we ordered fifteen of the 45-ton cars and have repeated the order until we now have sixty, and before another year passes we will have eighty of this type.

I do not want you to think that I am opposed to the light-weight car. Economy of every kind is both desirable and necessary. The point I want to make is that the comfort and convenience of the traveling public must have first consideration. The equipment should be designed for the character of the service it is to render.

After the comfort and convenience of the passengers is provided for, the cost of construction and the cost of operation should be considered in view of the service conditions. Because there has been opposition to increases in rates of fare, railway operators have too often concluded that low rates are the greatest desire of the car-riding public. But not so. What they want is *service*, and if given *real service* they are willing to pay reasonable rates.

While this weight and comfort elimination was going on the motor age entered. Has the motor car manufacturer waited for the customer to demand a change in the design providing for improved comfort and appearance? No! New styles stimulate trade. Just as Mrs. Smith wants a new hat that surpasses the new one worn last week by Mrs. Jones, so Mrs. Jones must have an automobile with a little more class, a little more speed and a little more comfort than the old bus driven by her friend Mrs. Smith. That is human nature! It is also human nature to want to patronize the dealer who offers new inducements, new comforts, better service, whether he deals in clothing, in automobiles, in flats or in transportation.

Added expense can easily be justified when it produces increased patronage. Reductions in investment and in operating costs are very expensive when they result, as they too often do, in loss of traffic. A recent experience on the North Shore Line will illustrate.

One-man safety cars were to be placed in operation on our Milwaukee city line. In designing these cars a number of improvements were provided, such as divided exit and entrance, wider aisles and wider seats with more knee space, and, most important, spring cushion seats upholstered in green plush. This added to the cost of the cars approximately $400 each and to the annual fixed charges probably $40 per car. At a 5-cent fare this requires 800 additional passengers per car per annum, or two extra passengers per day. Was the additional expense justified? I say it was. The cars have been in operation only about four weeks, but I venture any attempt on our part to remove these cars from Milwaukee service would meet a vigorous protest.

If you will pardon another reference to the North Shore, I will illustrate my point further. In our limited train service we operate regularly only steel cars, designed for both speed and comfort. On holidays we have to use the older wooden cars to provide a more frequent interval. In our express service we operate the steel cars when available. It is no unusual occurrence for patrons to let the train of older wooden cars go by, although these cars are kept in first class condition, and wait for ten minutes or even a half hour for the train with the steel cars.

This is an age of progress. Development is rapid. The methods of yesterday will not do today and today's methods may be out of date tomorrow. The horse has given way to the gasoline motor. The people want action, change and speed. They want things up to date, comfortable and convenient. Our industry is coming back. Better days and big opportunities are ahead for those properties which are up and doing and meeting the needs and demands of the communities which they serve.

Builders of street railway and inter-

*Paper presented before Illinois Electric Railway Association, Chicago, March 15, 1923.

urban equipment should be the leaders in improved car designs. They should be constantly bringing to railway operators the fact that they should add to the attractiveness of their service, by making the interval more frequent, by providing comfortable riding cars with every possible convenience, by keeping the cars clean and well ventilated, by keeping the outward appearance good by the frequent application of paint. The result will be greater popularity for these railway services, with increased traffic and financial results which will permit of the purchase of more and better equipment.

The Sale of the Ride*

The Theory of the Pass to Develop Off-Peak Riding Is Set Forth, with Particulars from Different Installations

By Walter Jackson
Fare and Bus Consultant, Mount Vernon, N. Y.

FORMERLY there were two classes of car riders, the industrial or business rider and the homekeeper. The former were good for at least twelve rides a week each, and the latter could be depended upon to use the street cars if they rode at all. People who wanted a real pleasure ride used the electric railway. Now, with automobiles so numerous, these two classes of customers have changed, and there is but one class—irregular. Expressed in a sentence: We have changed from a monopolistic industry to a competitive business.

How can we assure ourselves of the greatest possible proportion of consistent, rain or shine, patronage? By lower fares, by short-haul fares, by off-peak fares, by wholesale ticket rates, by commutation? Let us see the possibilities of each of these schemes.

Five Ways to Increase Patronage

First—Lower fares: No doubt a certain amount of business was lost to electric railways when the convenient 5-cent fare disappeared and the higher, awkward odd fare took its place. No doubt also a certain amount of business would come back if pre-war fares were restored. There is no warrant, however, for assuming that the increase in traffic will be great enough to offset the decrease in average fare and extra mileage. A lower fare would make little appeal to the automobile riders. They do not ride in machines to save money, but to avoid annoyance in fare transactions and to enjoy more speed and comfort.

Second—Short haul fares: This method is practicable in communities so large as to have ½ to 1-mile trips within the central area devoted to offices, stores and theaters. Such a district is usually too congested for easy automobiling, and as it is the place where the various car routes overlap, there is always the short headway necessary to secure people who would otherwise walk. For small cities, the short-haul fare is not applicable, because the interval between the cars is usually so long that too many persons could walk from the full-fare zones into the low-fare zone.

Third—Off-peak fares: These are applicable to any kind of railway, small town or big city, urban or interurban. This is simply a question of analysis. How is the traffic divided now among the different hours of the day? To what pleasure grounds and indoor entertainments would people be likely to go oftener if the off-peak fares would be used as a reminder of such excursions? Would it be wise to co-operate with home merchants, theaters, ministors, schools and so forth, in an experiment to try off-peak fares on a certain day of the week, or possibly risk the test for a full month or more? Whether we lose, break even, or gain in revenue, we are sure to be winners in good will, because we have shown a willingness to try. The best antidote to the uneconomic rush-hour cut fare is the installation of an off-peak rate of fare.

Fourth—Wholesale tickets: This is the most common differentiation in fare used today. One-man car operation, especially, compels attention to cutting down the number of change-making transactions. But the wholesale ticket rate for fares, no matter how liberal, does not achieve the purpose of securing or assuring consistent and frequent use of the cars. There is no time limit on the use of the tickets or tokens, and they can be divided among as many persons as there are rides to be taken.

Fifth—Commutation: This is the only form of rate heretofore orthodox which seeks to make a consistent user of the purchaser of the railway transportation. Usually it is confined to distances so great that only a few rides in excess of two per business day are taken. It follows that there is no point in offering more than sixty rides per month, because there would be no need for a larger number. Commutation books are non-transferable. This is a practicable measure on suburban railways, where the conductor meets the same passengers every day, but is not practicable on street railways. The experience in San Diego with a monthly non-personal commutation book has shown that this style of transportation book does not encourage voluntary riding.

The Personal Card and Pass

The Schaddelee monthly personal card was a big step forward toward securing consistent patronage. The purchaser pays a fee of 50 cents to $1 for a calendar month card and then pays only 5 cents a ride during the month, when the usual casual fare is 10 cents. The feature that keeps the monthly card from encouraging traffic to the utmost is that it is still necessary to give us a tangible fare each time a ride is taken. This seems to be the only valid explanation of the fact that the average use of the monthly card is about two fares a day. Another fact is that while a wholesale rate is given for consistent use, the trips are taken almost entirely during the rush hours. In short, we arrive at the workmen's reduced rate tickets in another guise. It might be possible to secure a higher number of rides a day from the monthly card holders by making the card fully transferable. Transferability is really too good a talking point to overlook, even though there may be little transferring in practice. Besides, people are always irritated at a rule which they know cannot be enforced.

The unlimited ride, transferable weekly pass, installed by the writer on a number of electric railways, is a blend of the foreign season ticket for unlimited rides and weekly ticket with a limited number of rides. The price is based on the theory that the holder must use more than twelve rides a week to have a profit, so that the reduction is for off-peak rides. The weekly pass riders never average less than three through rides a day, the maximum being found in smaller cities where from four to four and one-quarter rides per day are possible through the higher proportion of luncheon riders. Where this pass has been introduced there has been little or no reduction in the number of full cash fares. The pass riders come out of the ranks of those who were already using reduced rate tickets.

Characteristics of the Pass in Cities of Different Size

The characteristic features of cities below 50,000 population are: Extremely large ratio of automobile owners, excessive amiability of automobile riders toward walkers and exceedingly short distances between the homes and jobs, entertainments, stores, etc. In such communities an increase in fare does more harm than elsewhere, because so few people are compelled to ride in the cars. When a pass is introduced in these towns, the average number of rides per pass goes as high as four through trips a day or more. The reason is that so many of the buyers find it possible to go home to lunch. The cost of the pass is usually fourteen or fifteen times the ticket rate, bringing it to either $1 or $1.25. Among the pass-using cities of this class are Ashtabula, Ohio; New Brighton, Pa.; Bellingham, Wash.; Everett, Wash.; Fort Smith, Ark.; Oil City, Pa.; Franklin, Pa.; Houghton-Hancock, Mich.; Kenosha, Wis.; Racine, Wis.; Paducah, Ky.; Pine Bluff, Ark., and Santa Barbara, Calif. All

*Abstract of paper presented before the Illinois Electric Railway Association, Chicago, Ill., March 15, 1923.

are doing well, compared with previous records.

In cities between 50,000 and 100,000 population, the number of automobile owners and automobile pick-ups is relatively less than in the smaller towns. The services on several routes are also on closer headways, like ten and seven and one-half minutes, instead of fifteen and twenty minutes, so that there is a better chance to tempt walkers to ride. The opportunities for pass sale are enhanced by the fact that in cities between 50,000 and 100,000 there is often a variety of evening and holiday entertainments, in addition to a strong social intercourse. Cities of this kind using the pass are Fort Wayne, Ind.; Terre Haute, Ind.; Racine, Wis.; Tacoma, Wash., and San Diego, Calif. The pass is working out well in all those cities.

In cities with populations of more than 100,000, the distances tend to be too long to permit much luncheon riding except by the more leisurely office people and storekeepers. Therefore, rides in excess of two are not likely to be duplicates of the home-job rides. There are two cities of this kind with passes, i.e., Youngstown and Chicago —in the latter city used on the elevated railroads.

The pass was introduced in Youngstown, with 175,000 people, in October, 1921. The average number of through rides in Youngstown is about three to three and one-half a day per pass, due to the high percentage of transfers. The increase in earnings has been from a pre-war weekly average of $21,745 in September, 1921, to $26,143 in September, 1922, and then to more than $32,000 in November, 1922, before the company's motor buses added still further to the weekly gross. The increase in service has been well below the increase in traffic and revenue. The pass riders seem to me to consist of two contrasted types: The mill worker, who uses two lines and buys the pass for economy sake, because otherwise he would have to pay fare and transfer, and the office man, who buys the pass for the many extra rides he can secure. When the pass was introduced in Youngstown there were some 250 jitneys, but these have dropped to approximately one-half, the rest being able to hold on because of their taxicab operation, their freedom from regulation, their serving districts without car routes, etc. The company's own buses are now cutting down jitneys in that respect.

The Chicago Elevated Railways had no jitney competition to contend with, nor could automobile use and pick-ups be a really significant factor, but many riders had the choice of the elevated, the motor buses, the surface cars and the taxicab. The elevated pass not only offers to the regular rider the most convenient way of paying his fare, but also tempts him to use the service for short emergency trips that he might otherwise take in a different way. The elevated pass in Chicago alone is sold for $1.25, against a cash fare of 10 cents, and a ticket rate of three for 25 cents. Conclusions as to the effect of the pass cannot be drawn, because it was introduced simultaneously with a cut in the ticket fare from 8¾ cents (four for 35 cents) to 8⅓ cents, with a sharp reduction in school tickets and the introduction of a 3-cent fare to children under twelve years of age.

The Future of the Electric Railway Business*

War Conditions Brought to a Climax Troubles Which Otherwise Might Have Taken Years to Remedy—How and Why Good Public Relations Should Be Established

By W. H. Sawyer
President East St. Louis & Suburban Railway

FOR some time it has been customary before starting to talk about the street railway situation as of today to refer back to the troublesome war period. But I want to suggest the thought that our industry has already received some recompense for hardships endured during the dark times from which we have emerged. The war brought on speedily a condition from which we could not have escaped, and which otherwise would have taken us many years to right. I refer primarily to the fixed fare, set many years before when conditions were radically different.

Nationally speaking, the fixed fare of a nickel is past. I believe many more companies would have gone bankrupt had the struggle been prolonged instead of being brought as it was to a focus in the period of a few years time, due to the abnormal conditions resulting from the war.

Our fight for existence during that period also brought to our attention the fact that if we were to survive we must do everything possible to merit survival and that there were still things which we had not done which it was possible to do to help save ourselves. Let us review the situation that confronts the executive as of today in the street railway industry. What is his most important duty? It is so to conduct the policy of his company that it will merit better public relations, and not only better public relations, but satisfactory public relations.

Nothing Mystical About Public Relations

Important as it is, there is nothing mystical about the solving of our public relations problem. No other industry would expect to survive by simply quoting prices, accepting orders when sent in on proper form, and not following up and giving service after the sale was made. Our customers have a right to expect something more than platform room on which to stand after they have paid their fares. They should have courteous treatment, such as they would receive if they went as customers to the sales office of any other industry. One of the best rules to keep in mind is to operate as though there were a competing street car line on tracks alongside of ours and consider that every time we fail to satisfy a customer he will go over to the competing line. We must not forget that although we are legally and rightfully a monopoly, we still have competitors, and that proper, aggressive salesmanship and the four "c's," standing for courteous conductors and clean cars, will increase street car riding. Then we must give publicity to what we are doing and why we are doing it, just as any other business does which offers to sell good merchandise at a fair price.

There are still a few street railway company executives, as honest and sincere as you and I, who are not successful to the extent they should be because they do not know how their customers should be treated from a publicity standpoint. I have had executives tell me that they believed in advertising, but did not know what to advertise except when there was a change in schedule or in rates. My greatest trouble today is to find time and money to tell my customers the many things that I want to tell them in newspaper advertising. I am never at a loss for things to say. If there be a man among you who has as yet not whole-heartedly gone into newspaper advertising as one of the essential keys to success, do not longer hesitate. Go to your newspaper man; tell him your desires, and ask his help.

Second only to the public relations problem confronting an executive is employee relations. You cannot satisfy your public unless practically every employee is a sincere, enthusiastic salesman of your service and of you and your company. We often speak of welfare work, a proper term if properly interpreted. My own blunt way of saying it would be to say that we must treat our employees fairly. What we do should be done because it is right, because they are entitled to it. On the other hand, our employees are men and must stand on their own feet without undue coddling as to their personal actions and welfare.

Street railway wages today are more than 100 per cent higher than in 1913. The material purchased by street railway companies has increased over 70 per cent, construction cost has increased over 90 per cent, and the cost of living is close to 60 per cent above 1913, but street railway fares have increased approximately only 45 per cent. There must be efficiency to give the service which we are giving today at such a low comparative cost.

In spite of the publicity which we

*Abstract of paper presented at the meeting of the Illinois Electric Railway Association, Chicago, March 15, 1923.

are giving and other commendable things which we are doing, we are confronted from time to time with well-meaning people who tell us that the price of everything else has come down and that we should reduce the carfare. They do not realize that these other prices were reduced because they had previously been increased to meet peak conditions, while our rates were never increased in that way. I am against a reduction in street carfares today. What our communities need today that they may grow and prosper is more and better service, not a lower fare. I believe in the electric railway, operating with steel wheels on rails, but buses are going to be used, and under some conditions they are better than street cars. Where we have a situation which calls for bus operation we should operate buses.

Some say we also have before us the problem of the public utility commission, but if we can maintain satisfactory public relations we are going to have no real utility commission problem. The worst any commission has ever done was that which the public wanted done, or thought it wanted done, regardless of the consequences. The better our public relations the less discussion there will be with public utility commissioners.

Stores and Inventory Methods*

Centralization of Physical Storage Essential to Prevent Duplication of Stocks in Reordering—Stores Control Analyzed—Steps Taken in the Preparation of an Inventory

By Stanley P. Farwell
Bureau of Commercial Economics, Inc.

THE major expenditures of the operating departments of any company fall into two classes — labor and materials. In many cases the responsibility for the receiving, storing, disbursing and replenishing of materials and supplies is placed with the several departments. The primary interest of the construction department is in the rapid and successful completion of improvements; that of the maintenance department is in having the men and materials on hand at all times to keep the property in physical condition for continuous operation; and that of the operating department is in furnishing service to the public without interruption.

The efficient and economical handling of stores as an incidental function of the several departments is questionable of accomplishment and cannot be controlled by the chief executive in a manner commensurate with its importance. It is, therefore, of prime importance that the handling of stores be organized as a separate and independent department of the company, serving all departments alike, reporting direct to the general manager and responsible to him for (1) service to all departments, (2) efficient handling of materials, and (3) conservative investment in stocks.

The general storekeeper will be selected for his business ability and knowledge of materials. It goes without saying that the custody and control of a large part of the current outlay of the company should be placed in the hands of a high-caliber employee. There will be a storekeeper in charge of each major stores location. If the size of the property warrants, an assistant to the general storekeeper, sometimes known as the traveling storekeeper, will be directly in charge of the local storekeepers, and in general will assist the general storekeeper in carrying on the departmental activities efficiently. The record keeping will be supervised by a chief clerk, reporting directly to the general storekeeper. His duties will be to see that necessary records are accurately and currently compiled, that the reports required by the general storekeeper are promptly available, and that proper office discipline is maintained.

Layout and Facilities

The efficient handling of materials calls for centralizing the physical storage to the greatest degree possible to prevent duplication of stocks and reordering of materials through lack of information as to available supplies. Any argument for scattered stores is more than offset, in the case of present-day frequent train service on interurban lines, by the possibilities of quick delivery and the benefits of rapid turnover.

The selection of storage yard location and equipment for the storage of bulky materials should be governed by unloading facilities involving minimum physical labor, and possibilities of bringing the storage yard under physical control of the stores department, to insure orderly storage and correct disbursing.

The handling and replenishing of roadway materials is expedited by laying out specific locations in the yard for the various materials, making use of the principle of "unit piling," that is, orderly piling with a marker between units of 25, 100, 200, or 500, as the case may demand. The ability to count the stock rapidly and accurately will be of assistance in checking records, planning requirements, and controlling purchases.

Old material removed for service and replaced by new is a prolific source of disorder in storage yards and stockrooms. Facilities should be provided for their prompt handling and sorting. Definite means should be provided to sort scrap from reclaimable materials as soon as it arrives at the storage yards.

Replaced materials have been removed for cause, and unless they can be economically repaired or reclaimed it is good practice to scrap them at once. Procrastination is costly in labor required to sort them periodically, uncertainty as to what is available, loss of use of the money represented by the scrap value, and the bad effect on housekeeping sense of the department.

Less bulky materials and materials liable to theft, to be properly controlled by the stores department, must be kept in closed storerooms to which only stores employees will be admitted. These storerooms must be near the shops served by them, otherwise much unproductive time is spent traveling between shop and storeroom. Orderly piling and proper segregation and absence of rubbish and scrap parts are the first requisite of a good storeroom. As a means to this end, we know of none better than the so-called "daylight" shelving and unit piling. The stacks of shelving have no backs and are merely skeleton frames on which are piled standard trays of materials, each containing a definite quantity, easy to count, and capable of unlimited expansion or contraction as the stock increases or decreases. The daylight shelving is usually painted a light color. The open construction results in practically an unobstructed view from one end of the storeroom to the other. Poor housekeeping may readily be eliminated thereby, concealment being difficult with this equipment.

Stores Control

The functions of the department having been outlined, an organization created, and layout and facilities provided, the proper routine must be evolved so that the department may give continuous, uninterrupted and efficient service.

The company must know that it receives, in good order, all materials it pays for. The company must know that the materials it buys are charged to the proper capital or expense accounts as and when they are used and in the correct quantities. Otherwise the accounts are misleading and do not reflect actual conditions. The department must know what the current requirements are for all items of stock and the relation between the supply and these requirements at all times. Otherwise the item will be either out of stock or overstocked, either condition being inexcusable. Certain well-defined procedures to meet these requirements will be outlined:

Receiving Methods: The employee actually unloading or checking incoming bulky material should list the contents on a receiving form and sign his name as certifying to the accuracy of his statement. If the materials are received in a storehouse, the receiving dock should be physically divided off from the storage space. In this space,

*Abstract of paper presented before Illinois Electric Railways Association, Chicago, March 14, 1923.

the incoming goods should be unpacked, checked and listed on a receiving form, and the form should be signed by the same employee. Checking in of goods on miscellaneous scraps of paper, later to be transcribed to a receiving form, is a loose and inexcusable practice.

All material received should be checked against a copy of the purchase order to make sure that the purchase has been regularly authorized and that the vendor is delivering what has been contracted for.

The signed receiving form should be attached to the invoice as documentary evidence of the actual receipt of the goods by the company before payment is made.

The common practice of passing a material invoice upon the approval, for receipt, of any other person is indefensible and leaves a loophole for loss by carelessness or dishonesty, or both.

Insistence on the vendors showing the company purchase order number on all goods offered for delivery also is a great help to accurate and current receiving records.

Identification of Materials: An electric railway property will require from 3,000 to 10,000 different items and sizes of stock for its maintenance and operation. It is well known that any one article will be variously described by different employees. The descriptions are in many cases indefinite and misleading. Accurate record keeping under such circumstances is a difficult task.

The difficulty may be overcome in an entirely practical way by assigning a stock number to each item of stock and giving it a standard description that completely describes it. If the stock number with the standard description is used throughout the stores department on all forms, including purchase orders, receiving tickets, disbursing requisitions, bin markers, etc., the essential records will be increased in accuracy beyond all expectations.

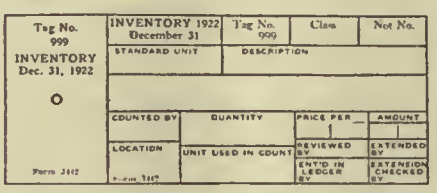
The continued success of such a plan, however, will depend upon placing the application of stock numbers to new items of stock and the keeping of a master file or index in the hands of one employee.

Disbursing Methods: Materials must be accurately disbursed, i.e., charged out to the proper accounts, at the proper time, and in the correct quantities; otherwise all the advantages of carrying stock accounts are lost. When operating departments are required to write disbursement requisitions from records of material previously used, an element of error is introduced. Failure to report the use of material in correct quantities, or even to report it at all, is certain to occur. Later check-ups disclose a discrepancy which must be rectified with a resultant upset to cost records and statistics of operations.

Wherever centralized stores and physical control by the stores department make it possible, it is certain to be of great advantage to disburse materials to the proper account when they are delivered to the operating department from the custody of the stores department. Certain stores, such as shop lumber and miscellaneous steel, are sometimes difficult to disburse as used. It is quite possible to make the distribution by means of a monthly inventory in connection with a carefully kept quantity stock record.

One method successfully employed to control the issue of certain classes of stock is to require the return of the worn-out or damaged part in exchange for the new one. This applies to tools, brass goods, and the like.

Certain small stocks are required to be on hand at distant parts of the system and in quantities not warranting the presence of a storekeeper. It is satisfactory in such cases to make weekly deliveries to these locations, charging out the materials to operating accounts as they leave the main storehouse. This practice should be safeguarded by a close scrutiny of the weekly requisitions, and at stated intervals all accumulations of stock at these points should be returned to the main storehouse for credit to stock, or to be salvaged or scrapped.



Form J. B. 449. 1500 sets. 12-22.

INVENTORY TAG CORRECTION — To .....Name Attached is Inventory Tag No.....Road..... Class.....Lot No..... Quantity..... Unit.....Description .... This Tag is incorrect or incompiete as foiows: .... You will make necessary investigation and correct this discrepancy on the inventory tag by drawing a line through the portion in error, entering the correct information, and signing your name on the back of the tag. Return corrected tag and this form to Inventory Headquarters.

Reviewer.....

At Top, Facsimile of Coupon Tag and, Below, Wording of Form that Appears on the Back

Replenishing Stocks: In the general storekeeper's office a simple quantity stock record should be maintained, to which should be posted receipts and issues in quantity only. This record should at all times be strictly up to date. The balance on hand should correspond with the physical count of the stock in the storeroom.

It should be the means by which he governs his purchases so that he will not run out of stock, or will not have an over-supply. Improvements often have to wait because the stores department is over-stocked on parts about to become obsolete.

The requisitions for purchase from shop and road executives and from local storekeepers should be scrutinized on the showing of this record and recommendations to the management made accordingly.

It is recognized that errors are likely to creep into any stock record. They should, therefore, be currently checked up. The local storekeeper should be assigned a definite number of items to inventory each day for comparison with the stock record. The effect on the local storekeeper will be worth while, his knowledge of his stock increased, and slow-moving and obsolete materials brought to light.

Stores Accounting Methods: Stores accounting covers the distribution of purchase invoices to proper accounts and the pricing, extending, and checking of issue tickets and their distribution to the operating accounts, and the preparation of any statistical data from these documents that the management shall require. All documents involved in this accounting originate in, or pass through, the stores department.

It is usually very desirable, for many reasons, that this work be done by an organization independent of the stores department, because:

1. It is primarily a bookkeeping operation, and as such will be more successfully handled in auditing department.

2. If handled by the general storekeeper, it is certain to distract his attention from the prime responsibilities of his position.

3. It provides a check on the accuracy of the work of the stores department, whereas if handled within the department errors could continue indefinitely without chance of being brought to light.

The stores accounting division should provide the general storekeeper and the management with a periodical report to point out the extent to which proper storekeeping methods have been made use of. This is readily possible through the use of the "Material Classification" adopted by your association. The report should show the turnover of stock in each class of material for each storekeeper and for the department as a whole. The records of storekeepers could be compared one with the other, and each one with its previous record. This would be a sure method of revealing slow-moving stocks and unwarranted investment.

Inventory Methods

Having outlined the functions and methods of a properly organized stores department, it is proper now to call attention to the necessity for a yearly inventory which will, properly executed, reveal the extent to which the department has adhered to principles and routines, and will reconcile the values of the stores as shown by the general books with the physical facts.

The popular conception of a physical inventory is the assembling, on the day following their notification, of an inventory crew, provided with inventory cards or lists and instructed to make a record of everything in the place. This is accomplished after a few days of prodigious effort and the mass of detail is unloaded on the stores employees to decipher, classify, price, extend and total. These operations hang on interminably, the current work of the organ-

ization falling farther and farther behind. The inventory finally completed is partly correct, partly complete and partly dependable.

We wish to present a method of inventorying, of which the two major results to be obtained are:

1. To take an accurate, complete, and dependable inventory.

2. To complete this inventory within a definite minimum time limit, insuring the least possible disturbance and inconvenience to the operating departments.

The lack of identification, standardized descriptions and status (stock or non-stock), which makes the compilation and computing of the inventory so arduous a task, must be foreseen and forestalled. This work should be done prior to the physical count, not after.

Also in view of the fact that the stores stocks of electric railways are usually scattered in yards, storehouses, repair shops, terminal shops and on the right-of-way, and further in view of the fact that there can be little reduction in operating and maintenance during the inventory period, it is essential that a schedule be adopted and adhered to unconditionally.

Experience shows that the following schedule is about right: Period of preparation for the physical count with minimum staff, seven weeks; period of physical count with maximum staff, one day; period of pricing and totalling inventory after count has been taken, ten days.

Briefly, the general plan is this:

All materials involved will be segregated, identified, and classified in advance of the inventory date. A coupon tag, with stock number, description, and issuing unit written on it in advance from the stock ledgers will be placed on each lot of material by the stores department in all locations protected from the weather before inventory day, so that counting only is necessary on that day. Outside materials will be taken on a list to be transferred to tags later for uniformity, assembling of like materials, and convenience in pricing and posting. These tags will be controlled by a serial number to insure collecting and recording every tag sent out.

A temporary inventory organization is assembled, independent of the operating departments, but selected from their personnel to secure men familiar with the materials and routines.

This organization will direct the advance preparation of the stocks and the writing and distribution of the detailed instructions and the inventory tags; will select the supervisors and counting crews for inventory day; review, price, and post the inventory as collected, and be generally responsible for all inventory plans and their execution.

The first step in building this organization will be the selection of a general inventory supervisor to be in charge of all operations and responsible for results throughout. He will be a man with some responsibility in the company, preferably from outside the stores department, accustomed to handling men and to plan and execute a program, and will be relieved of his routine duties, at least in part, for the period of the inventory program.

He will select his own staff, having been assured of the co-operation of the other department heads by the announced backing of the management.

The preparation for inventory will consist of the following steps, the starting time and allowed time for execution depending somewhat on local conditions:

OFFICE WORK

1. Design and order inventory tags.
2. Write up inventory tags from stock ledgers.
3. Compile written instructions for all steps in the program.
4. Determine correct price for every item shown on stock ledgers for purpose of pricing inventory.
5. Select personnel for counting organization and school them.
6. Select personnel for clerical organization and plan their work.

FIELD WORK

1. Eliminate obsolete materials from stock.
2. Dispose of all scrap.
3. Assemble all lots of identical materials in as few locations as practical.
4. Provide positive identification of all materials.
5. If material is special, identify permanently by painting or tagging it with stock number and description.
6. Separate new and second-hand materials unless their value is identical.
7. Identify by a distinctive tag all materials held as emergency parts, but of no intrinsic value and not to be included in inventory, also items of doubtful usefulness.
8. Pile materials so that they may be easily and accurately counted.
9. See that no items of stock are mixed in the same bin or pile.
10. See that operating departments do not upset these arrangements when removing new materials or bringing in old materials before inventory day.

The counting organization (to function for one day only) will be built up as follows:

A careful estimate will be made of the number of men necessary to count the stock in one day in each and every stock location of the company. These men will be grouped in units of three, with a supervisor whose function it will be to watch the count for accuracy and completeness. Assistant general supervisors will be appointed, to whom will be assigned a definite number of inventory crews, and who will be responsible for the completion of the inventory on schedule for the portion of the property assigned to them. The assistant general supervisor will report to the general inventory supervisor.

CAREFUL PREPARATION FOR INVENTORY

Complete instructions will be written for all members of the counting organization, who will have been selected for their familiarity with the particular material they are to count.

Care must be exercised, however, to avoid selecting men who in an operating emergency might be called away from the job, thus upsetting the schedule.

Crew supervisors and assistant general supervisors will meet at least three times before inventory day for schooling, and will go over the locations assigned to them so that they may lay out their work for inventory day.

The crew supervisors should be required to report, before the starting hour, arrival on the job and presence of their full crews. Written instructions should put them on their guard for the common errors. Constant watch will be maintained for material overlooked in the preliminary tagging.

The counter will enter the quantity and unit on both the main part of the inventory tag and the stub left on the material, and the crew supervisor will take notice of the quantities on each stub to catch radical errors.

A large number of details, too many to enumerate in this paper, enter into the carrying out of this program, both in the preparatory period and during the actual count. The count completed without mishap and on time, as it surely will be if the plans have been conservative, the tags, with sequence of numbers established, will be turned over to the general inventory supervisor and the counting organization will be disbanded.

The general inventory supervisor in the meantime will have assembled the clerical and technical organization to price and list the inventory. The work from this point will be handled by organized groups as follows:

1. Reviewing Group, which will review inventory tags for (a) missing numbers; (b) accuracy of description, unit and stock number; (c) legibility; (d) assembling of all tags with same stock number.
2. Correction Group, which will (a) look up missing tags; (b) correct faulty descriptions; (c) correct errors in count; (d) furnish information necessary for conversion of units.
3. Computing Group, which will (a) post inventory to stock ledgers; (b) price and extend inventory tags; (c) compile total value of inventory by stock classification.

After this work is completed and the general books adjusted, if need be, it is desirable to have the inventory listed in book form and in the necessary number of copies to supply interested departments. This should be a means whereby the general storekeeper may still further quicken his turnover. After so thorough a preparation it must be apparent that certain results will necessarily follow, to-wit:

1. The stores department starts the new period with work caught up since the inventory is planned and completed on a schedule and with an organization drawn from the personnel of all departments.

2. The thorough overhauling of all stocks has put them in the best possible shape to serve the operating departments.

3. Any weak spots in the routine and personnel of the stores department are certain to be brought to light.

4. The inventory, contrary to precedent, will be complete and accurate.

Standard Classification of Accounts

A NEW edition of the standard classification of accounts prescribed by the Interstate Commerce Commission and adopted as standard by the American Electric Railway Accountants' Association, together with accounting bulletin No. 19 of the Interstate Commerce Commission answering questions in connection with the classifications, both of which are government publications, have now been printed and copies are available to members at cost.

Monthly Freight Journal Entries*

A Comprehensive Statement of the Procedure Followed by the Company with Which the Author Is Connected—The Records Are Explained Step by Step

By A. W. HEATH
Chief Clerk South Bend & Northern Indiana Railway, South Bend Ind.

I HAVE been requested to explain the method used by the Chicago, South Bend & Northern Indiana Railway in compiling its freight journals. Let us start from the time the agents' reports are received at the company's office and go through the routine until complete compilation is ready to be used by the bookkeeper.

Recapitulation of Agents' Abstracts—On this form are shown the amount of freight charges received, advance charges received and prepaid charges forwarded on local, interline and express freight as debits to the various stations, as well as advance charges forwarded and prepaid charges received on local, interline and express freight as credits to each station.

Station Agents' Freight Journal—On this form are carried as debits against each agent the following: Balance from previous month, total freight received, prepaid forwarded, storage, switching, over-collections, auditor's debit advices, junction settlements, demurrage and any other items which should properly be charged to the freight agents' accounts. Each agent is credited with advances forwarded, auditor's credit advices, junction settlements, remittances and any other items which should be properly credited to the freight agents' accounts. On this form is worked out the net debit of each agent for the month. The "net debit" is the difference between the current charges and credits, not including remittances. To prove this form the total of previous month's balances is added to the total of net debits, deducting the remittances, which amount must equal the balance due the company for the month.

Interline Freight Journal—On this form as debits are shown the proportions of interline freight charges to be received from freight forwarded, the proportion of freight charges in which the company was the intermediate carrier, advance charges on interline freight forwarded (these amounts are taken from reports made by connecting lines), prepaid charges on interline freight received (this amount being taken from reports rendered to connecting lines) and correction accounts which are debits. As credits are shown the proportions of freight charges on interline freight received which have been reported to connecting lines, advance charges on interline freight received (these amounts being taken from the reports rendered to connecting lines), prepaid on interline freight forwarded (this amount being taken from reports made by connecting lines), and correction accounts which are credits.

On the debit side of this form is a column used for showing the balances due connecting lines, and on the credit side a column for showing the balances due the company. To prove this form the totals of debits as outlined above and the total balances due connecting lines must balance with the totals of credits as outlined and the balances due the company.

To the right of this form is a column showing the total amount of freight charges received from each connecting line, the total of which must balance with the total of interline freight charges received as shown on the recapitulation of agents' abstracts. In the next column on this form is shown the proportion of interline freight received, which added to the amount of proportions reported to connecting lines, must balance with the total of interline freight charges received as shown on this form, as well as the interline freight charges on the recapitulation of agents' abstracts. The total of prepaid charges received and advance charges received on interline freight as shown on this form must balance with the agents' recapitulation of abstracts.

Freight Revenue—In figuring the freight revenue for the month an entry is made up showing the total amount of proportions of freight charges received which have been reported to connecting lines, correction accounts which are debits, auditor's credit advices and all other charges which are a debit to freight revenue. As credits appear the proportion of freight forwarded reported by connecting lines, the proportion of overhead freight, over-collections, auditor's debit advices, and any other items which are a credit to freight revenue. The difference between these amounts will either be a net debit or credit to freight revenue, which deducted or added, as the case may be, to or from the total amount of freight received as shown on the station agent's freight journal, will show the total freight revenue for the month.

To prove the correctness of this take the company's proportion of interline freight received from the connecting lines, the proportion of freight forwarded and reported to connecting lines, the proportion of overhead freight, and the total of correction accounts which are debits (these items are to be found on the interline freight journal), over-collections and auditor's debit advices from the station agent's freight journal, and the amount of local freight and express from the recapitulation of agents' abstracts. From this total deduct the total of correction accounts, which are credits on the interline freight journal, and auditor's credit advices from the station agents' journal, the difference being the same amount as explained in previous statements.

Advance Suspense—To this are charged the total advances forwarded reported by agents and total advances received reported to connecting lines, and it is credited with total amount of advances received reported by agents and total advances forwarded reported by connecting lines. The difference between these items is carried to the final entry, and will reflect the amount of advances that are not settled, which are carried in the transit account.

Prepaid Suspense—To this are charged the total amount of prepaid received reported by agents and the total amount of prepaid forwarded reported by connecting lines, and it is credited with the total amount of prepaid forwarded reported by agents, and the total amount of prepaid received reported by connecting lines. The difference is carried to the final entry and will reflect the amount of prepaid charges that are not settled, which are carried in the transit account.

Final Entry for Use of Bookkeeper—After these details have been worked up, the following are listed: the agents' net debits, advance or prepaid suspense, if this is a debit, and balance due from connecting lines; then as credits are listed the various items which are credits to revenue accounts, advance or prepaid suspense, if this is a credit, and balances due connecting lines. This makes the complete journal voucher for posting to the general ledger accounts.

*Abstract of paper read at meeting of Central Electric Railway Accountants' Association, Lima, Ohio, Feb. 23 and 24, 1923. The forms referred to are not reproduced as their make-up is clear from the lists of headings given by the author.

Safety Code on Walkway Surfaces

A CONFERENCE attended by sixty-three representatives of trade associations, technical societies, safety organizations and government departments held in New York on Feb. 14 voted that it is desirable to have a nationally uniform safety code on walkway surfaces and that the development of this code should be carried out under the procedure of the American Engineering Standards Committee. This new code will apply to railway cars, railway stations and train platforms, schools, theaters, etc.

The performance characteristics to be considered in walkway surfaces are: Resistance to slipping, durability, freedom from the tripping hazard, and flammability. General and maintenance requirements will also be included in the code.

The next step in the development of this code will be the appointment of sponsors by the American Engineering Standards Committee and the organization of a sectional committee which will draft the code. This sectional committee will be composed of official representatives of all organizations concerned with the subject of safe walkway surfaces, either as producers, consumers, underwriters or officials.

Railway Engineering Association Meets in Chicago

Attendance and Exhibits Good, Though Not as Large as in Some Former Years—Many Committee Reports Presented

THE twenty-fourth annual convention of the American Railway Engineering Association was held in Chicago March 12-16. An attendance of 1,000 members and guests was registered. While this was not as great as last year, the meetings were crowded, indicating that many attended who failed to register. Meetings each morning and afternoon, a banquet one evening and a continuous exhibit held simultaneously by the National Railway Appliance Association indicate the full program participated in by those in attendance.

Lack of economy and efficiency are the admitted faults of the railroads today, according to R. H. Aishton, president American Railway Association, who gave a brief address the opening morning of the convention. To overcome these conditions has been the problem confronted by the steam railroads, and whatever solution they may find will in a way be applicable to the electric railway. One of the most important problems confronting the railroads today is not only obtaining labor but to retain the labor. A committee which has this under consideration received the encouragement of Mr. Aishton.

President Campbell in his address delivered at the opening session commended all the committees on the resourceful work during the past year and summarized the collaboration of these committees with other organizations. He spoke at length about the committee on standardization and remarked that fifteen industrial countries had a national standardization body composed by association of representative engineering, industrial and governmental organizations for the work of standardization. While he well appreciated the work and effort of the American Engineering Standards Committee, which is the name of this body in the United States, he felt that since the requirements of the railways are so large, distinctive and important, they should make their own standards untrammeled by entangling alliances. However, in things used in common by the railways and others, the argument of the A.E.S.C. has some weight. Enlarging upon this question, Mr. Campbell stated that his objection to standardization is that it tends to stagnation of progress and improvement as to the thing standardized. If standardization was synonymous with perfection, his objection would be removed; however, perfection is rarely, perhaps never, attained. There may be standardization of some things highly developed, yet there should be an understanding that the standard is subject to revision from time to time as progress in the art warrants or requires. Although the American Railway Engineering Association has been engaged for years upon the work of standardization for the roadbed and track it has recorded its results under the name of recommended practice. To emphasize this point Mr. Campbell spoke of a recent canvass he had made of companies in regard to their adopting recommended practices as printed in the Association's Manual. Of the replies received only 23.5 per cent have made the recommendations standard or as nearly standard as possible, while 36 per cent have taken the recommendations as a guide. He urged all members to sell these recommendations to their respective roads.

Upon request of the International Railway Congress for a subject to be considered in London in 1925, the association recommended the subject of "Grade and Alignment Revision vs. Heavy Steam Power or Electrification."

At the business meeting on Thursday Edward H. Lee, vice-president and chief engineer Chicago & Western Indiana Railroad, was elected president for the ensuing year of the American Railway Engineering Association. At the annual meeting of the National Railway Appliances Association, L. W. Shugg, General Electric Company, was elected president of that organization.

An abstract follows of some of the points of particular interest brought out in the committee reports or in the discussions which promise to be helpful to electric railway officials:

ELECTRICITY

The committee on electricity, E. B. Katté, chairman, presented a voluminous report, including the following specifications with the recommendations indicated:

Specifications for adhesive tape for general use for electrical purposes. (Same as A.S.T.M. Serial Designation D69-22T.) Submitted as recommended practice, to be printed in the Manual.

Specifications for rubber insulating tape. (Same as A.S.T.M. Serial Designation D119-22T.) Same recommendation as above.

Railroad specifications for electric light, power supply and trolley lines crossing railways. Approved by the committee Oct. 5, 1922. Same recommendation as above.

On the subject of water power, the committee presented a compilation of data, from several sources, showing in detail the water-power resources of the country. As to the "super-power survey" of the Geological Survey, this was stated to be a valuable contribution to the literature of the subject. However, the committee believes that the time is not yet opportune for the association, as a body, to interest itself in this major project.

With regard to electrolysis, mention was made of the close but negative vote on the motion to disband the American Committee on Electrolysis. The A.R.E.A. voted to disband, the A.E.R.A. to continue. The committee, however, recommended continuation of representation on the American committee; also that further reports on the effect of electrolysis on reinforced concrete be discontinued at least for the present.

The most interesting part of the report, to electric railway men, dealt with the year's developments on Part 2 of the National Electrical Safety Code. Referring to the famous conference of March 2, 1922, held under the auspices of the American Engineering Standards Committee, the report stated: "The conference resulted in the somewhat unusual action of the adoption by the A.E.S.C. of the U. S. Bureau of Standards' National Electrical Safety Code with the proviso that Part 2 thereof would be subjected immediately to revision by a sectional committee. . . . While the conference was called to determine whether there should be a set of national specifications for crossings between overhead electric wires and railways and between different wire crossings, the primary recommendation of the conference was the approval of the National Electrical Safety Code with provision for certain revisions." This procedure was opposed in the main committee of the A.E.S.C. by the A.R.A. representative, but by letter ballot the A.E.S.C. approved the "Code" and announced the formation of a sectional committee to consider revisions of Part 2.

The "Code" was stated in the report to be acceptable as to recommended practice except for certain requirements in Part 2 which pertain to factors of safety and clearances for wires and cables crossing over railroad rights-of-way. The representatives appointed to serve on the sectional committee are: George Gibbs, Long Island Railroad; W. L. Morse, New York Central Railroad; G. H. Dryden, Baltimore & Ohio Railroad; E. C. Keenan, New York Central Railroad. The committee recommended that co-operation with the U. S. Bureau of Standards be continued with a view to reconciling, so far as possible, the requirements of Part 2 of the National Electrical Safety Code and the association's 1922 specifications for electric light, power supply and trolley lines crossing steam railways.

The committee listed the state representatives and alternates who had been appointed, under authorization of the board of direction, to represent it, and recommended that members having transmission-line crossing problems confer directly with these representatives.

One other matter of interest was the recommendation that rules, given in the report, for the protection of oil sidings from danger due to stray currents be

approved as recommended practice and printed in the Manual. As to recommendations for next year, these had principally to do with continuation of unfinished work, together with a study of insulators, and knife and snap switches and revision of the tables showing third-rail and overhead working conductor clearances.

Co-operation with A.E.S.C.

Close co-operation between the association and the American Engineering Standards Committee was recommended in the report of the committee on standardization. At present the association is a member of the A.E.S.C. only indirectly, through the American Railway Association, although it has presented to the A.E.S.C. for adoption as "American standards" two of its specifications, those for fixed and movable railway bridges. Discussion of the report dealt with the question of whether the association should become a member of the American Engineering Standards Committee.

A. W. Whitney, chairman of the latter body, and J. A. Capp, vice-chairman, addressed the meeting, giving reasons why the association should join. Mr. Whitney urged that the A.R.E.A. is not a sufficiently large interest to work by itself, out of contact with other interests. Mr. Capp argued that railroad men need the broadening effect of discussing their problems with other groups of men having related problems. On the other hand C. A. Morse, Rock Island Lines, expressed the view that the association has enough to do in getting the railways together in using the association's standards, and is little concerned with having these standards approved by outside interests. He held, also, that the problems of electric railways and of industrial trackage are distinct from those which are before the association. E. B. Katté, New York Central, said that the association's committee on electricity had recently been outvoted in a national standardizing body and a specification adopted that is less strict than the railway interest requires. To show that the work of the A.E.S.C. is too complex and too slow for the association's needs, he cited the delay of more than two years in formulating insulated wire specifications. The association would find itself in an unsatisfactory condition if it had not prepared its own specification. He favored continuing the present representation on the A.E.S.C. by one member, as against an increased representation.

O. F. Dalstrom, Chicago & Northwestern, made the point that the association must be represented in the A.E.S.C. in order to defend its own interests and prevent the adoption of standards not acceptable to it. He instanced the fact that two railway bridge specifications are now in the field, and that it is essential for the association to submit its own specifications to the A.E.S.C. for adoption, as it has done. E. A. Frink, Seaboard Air Line, argued that standardization by a single industry, such as the railways, can never equal that done by a national body such as the A.E.S.C.

No action was taken by the meeting.

Wooden Bridges and Trestles

The committee on wooden bridges and trestles recommended the approval of plans for open-deck pile and frame trestles and multiple-story trestles and ballast-deck pile trestles. The subcommittee, headed by J. B. Maddock, has made a very thorough study of the subject and the report contained many diagrams of recommended trestles.

Signs, Fences and Crossings

The enormous programs for highway construction in the United States and the increased importance of the highway grade crossing as a consequence of the marked increase in the number and speed of highway vehicles has been an incentive to the committee on signs, fences and crossings. Specifications for highway crossings, covering such matters as grade, width, drainage and flangeways, were submitted. A brief report was presented on substitutes for wooden crossing planks, indicating the results obtained with concrete and bitumen crossings. Advice has been received of the construction of 184 crossings of bituminous materials during the past year.

Iron and Steel Structures

The most important feature in the report of this committee was a complete set of specifications for steel highway bridges. These will fill a real need because railway engineering officials are now frequently required to design and construct highway bridges as a consequence of the enormous highway construction programs. The report also included specifications for the erection of steel railway bridges.

Masonry

A progress report was made by the committee on current developments in the art of mixing concrete. Another report made by this committee gave information as to the factors causing deterioration of concrete, based on reports obtained from various sources on defects found in existing railway structures. It was found that the first cause of deterioration was of chemical nature, a study of cases where concrete had been affected by acid, alkali, or sea water action. The second cause, namely, mechanical, was generally found to be of an abrasive nature. The action of clamshell buckets and ice or other floating objects caused this form of deterioration.

Records and Accounts

The report of a sub-committee brought out the feasibility of reporting engineering data in graphic form. It also submitted a number of recommended diagrams. While statistical data usually consist of tabulated figures which afford no perspective or mental picture, a graphic form can save much time and mental effort necessary to draw correct conclusions from the data. These charts or diagrams should be easy to draw and read and should be so made as to show both the actual and relative magnitude and importance of the several quantities.

Rules and Organization

The report of this committee brought out the peculiar position the committee now was in owing to the fact that all rules governing officers and employees except those involving matters of discipline must have some bearing on the manner of conducting the work. Therefore, the work of this committee frequently tends to overlap that of other committees dealing with particular phases of maintenance of way. A study has been made by the committee on the organization of work where mechanical appliances and tools are used.

Track and Stresses in Track

The joint committee of the association and the A.S.C.E. on stresses in track presented an extended progress report, the third in the series, and included the results of many tests on straight and curved track to determine the effect of counterbalance and speed, etc. Among the facts of special interest to electric railways brought out by the committee on track were the results of some tests on curved rails and the conclusions in regard to guard rails. One question considered in connection with curved track was whether railways were justified in going to the expense of pre-curving rails for curves instead of laying straight rails. In 1915 the association recommended that rails for curves of 4 deg. and over should be curved before being laid. In 1921 the rules committee suggested that rails should not be curved "except on very sharp curves, much sharper than usually found in main line tracks." A questionnaire showed a marked tendency toward not pre-curving the rails. The Baltimore & Ohio Railroad used both curved and straight rails on curves of 4 deg., and over, and decided that on curves up to 12 deg. 30 minutes, which was the heaviest curve in new rail territory, track could be maintained for line and gage as economically when laid with straight rails as with curved rails. The committee says in conclusion: "It seems to be a question whether pre-curving justifies the expense."

In its conclusions on guard rails for protecting curves, the track committee does not recommend their use except on sharp curves and in special locations, where the super-elevation is inadequate. Allowable speed should not be increased on curves because guard rails are installed.

Roadway

Under chemical killing of weeds, the committee reports that 31,500 miles of track have been treated with a chemical weed killer since 1914, sodium arsenite being used in practically all cases, one part of concentrated solution to twenty

parts of water. The cost of the chemical on a strip 1 ft. wide and 1 mile long is $3.46. The chemical has no bad effect on the track, but treated vegetation is dangerous to stock and if the weeds are at points where stock can reach them, a chemical making them unpalatable should be used. The Erie Railroad reports good results with salt as a weed killer, 0.8 carload per mile being required. Regarding culverts, the committee says that corrugated metal culverts should preferably be used only in places where the top of the pipe is not less than 3 ft. nor more than 10 ft. below subgrade, and where the diameter of the pipe is not in excess of 48 in. The material should be high grade metal or as nearly pure as possible and with rust-resisting properties. Galvanizing alone is not sufficient to protect the metal from rust.

Wood Preservation

The report of the committee on wood preservation was largely taken up with the subject of marine piling, the subcommittee assignment having been "to make final reports, if practicable, on treatment to be used in the protection of piles and timbers in water infested by marine borers." As a result of elaborate investigation, given in extenso in the report, it was recommended that timber and piles be carefully creosoted, there being no other treatment in sight at present. Along with careful creosoting, certain features of selecting and preparing the lumber and piles before treatment, and of handling after treatment, are of vital importance. These the committee gives under the head of "recommendations for handling and installation." Sample recommendations are these:

"Do not use cant hooks or dogs in handling. Use rope slings. Frame and bore all timbers before treatment, whenever practicable. Particularly avoid cutting or boring below high water mark."

On the subject of service test records, the committee reported a lack of interest on the part of the railroads in sending data to the United States Forest Products Laboratory. The committee sent out a questionnaire to cover the practice in the use of treated timbers in bridges, docks and wharves. Replies indicated that on open deck bridges, the timbers treated with creosote have given a life from fifteen to twenty-five years and over; treated timbers used in ballasted deck bridges have given a life from fifteen to thirty years, and on docks and wharves, where treated material has been used, a life from fifteen to forty years has been secured.

Regarding the treatment of Douglas fir, this was stated to be a most difficult timber to treat, offering as it does such great resistance to the injection of the preservative. In the treatment excessively high temperatures in combination with excessively high pressures should be avoided as the timber may be injured thereby. Douglas fir is, however, thoroughly satisfactory if properly treated and given proper handling after treatment. The committee gave full specifications for the treatment and handling of Douglas fir.

The committee favored the application of preservative to all so-called "sap" ties of the species usually included under the term "white oaks." The so-called "heart" ties of the species usually included under the same term can be treated efficiently so that they should withstand decay in a manner similar to other treated ties, if proper precautions are taken. A decision to treat such ties should be made after a study of the conditions at hand on each particular line and in each particular locality has shown that economy can be effected thereby.

A sub-committee on mechanical preparation of timber for treatment, including adzing and boring for ties, called attention to the following salient points:

1. The framing of bridge timbers and particularly of bridge ties and guard rails before treatment is practicable and economical.

2. Practically all hewed ties and a large proportion of sawed ties require adzing, and this may be done at less cost by machinery than by hand.

3. Adzing of ties after treatment removes a portion of the most thoroughly impregnated wood and reduces the resistance of the tie to decay.

4. Spikes offer greater resistance to withdrawal when driven in bored holes of proper size than in the solid wood. The proper size of hole is a subject on which opinions differ, but for soft woods $\frac{1}{8}$ in. less and for hard woods $\frac{1}{16}$ in. less than the diameter of cut spikes appear to be accepted as correct.

5. The boring of holes before treatment greatly assists in the distribution of the preservative through the tie.

6. Holes should be bored all the way through the ties. This opens additional cross-sections to the direct action of the preservative and prevents the accumulation of water in the hole.

In an appendix to the report, directions for determining the penetration of sodium fluoride in wood were given. These had been prepared in conjunction with members of the preservative committee of the American Wood Preservers' Association.

This method requires the following chemicals and apparatus:

Solution 1. Ethyl alcohol (not denatured), 95 per cent, saturated with potassium thiocyanate.

Solution 2. Dehydrated ether, containing 1 gram ferric chloride for every 50 cu.cm. This solution should be kept tightly corked to prevent it from becoming too concentrated on account of evaporation of the ether.

To make tests mix equal portions of solutions 1 and 2 in an ordinary atomizer. Spray mixed solution on the dry section of wood to be tested. Spray mixed solution evenly all over. The line of demarkation between the treated and untreated portions will soon be noticed. The color of the treated wood will remain unchanged. The untreated wood will be stained red. Ordinarily the first spray will not yield a permanently distinct stain. Therefore, dry this section and repeat as often as necessary to obtain satisfactory depth of color. Water in the spraying solution causes the stain on red oak to turn black (tannic acid). Therefore, for staining red oak, add an equal quantity of ether to the ferric chloride ether stock solution, together with a few crystals of potassium thiocyanate, and spray as above.

Yards and Terminals

While the report of the committee on yards and terminals relates to operating conditions considerably different from those of electric railways, there is much in it that would be suggestive to electric railway managements planning new terminals or terminal reconstruction. The report contains plans of many terminals, a bibliography covering railway passenger stations, data (in curve form) regarding areas of different parts of terminals in terms of numbers of rush-hour passengers.

Ties

The principal part of the report of the committee on ties dealt with substitute ties. Reports of experience with various types were reported and recommendations as to features desired in such ties were listed. Four types were mentioned as worthy of further investigation, as adapted to steam railroad use. The committee also gave attention to piling of ties in storage, including diagrams of different plans for piling them.

Merits of the Company Publication*

It Possesses Certain Advantages Over Group Meetings in Promoting Employee Loyalty and Public Appreciation of the Service

By A. R. Baxter

General Superintendent Indianapolis & Cincinnati Traction Company, Rushville, Ind.

IN OUR work the fundamental idea is to bring departmental heads and their employees into a closer relationship, in order to secure better co-operation and, in turn, better service. Service is what we have to sell and if we do not produce a good brand, we cannot meet the demands of the market (the traveling public) and hence will not get our share of the business.

The heads of departments may get important matters before their men, as a body, through group meetings, or through the issuing of a company publication. The former has been tried and has produced some good results; but on account of the nature of railway service, many employees are unable to attend the meetings. The absentees may be the very ones who bring us closest

*Abstract of paper presented at the annual meeting of the Central Electric Railway Accountants' Association, Lima, Ohio, Feb. 23 and 24, 1923.

to the public, and are those toward whom most criticism is thrust. Therefore this method falls short of our ideals.

The purpose of a house publication is threefold, and the essentials may be enumerated as follows:

1. To create in each employee an interest in the company and an earnest desire for its success; in other words, to sell the company to the employees and make them feel that they are a part of it.

2. To sell the company to the public; to make the service such that the public will feel proud of it; to show the public that it is the only system that will take care of transportation troubles at all times and in any kind of weather; to show the public that it is one of the best and cheapest necessities, and should be maintained and respected.

3. To convey to the employees ideas, rules and regulations for the betterment of the service.

The publication should be made so interesting and instructive that the appearance of each issue will be eagerly awaited by both employees and employer.

Each issue should contain personal items and the name of every employee should appear not less than once a year in its columns; giving him honorable mention for good work done, no matter how meager his task may be.

No opportunity should be neglected to publish historical or an educational article on the industry which the publication serves.

Each department of the organization should furnish enough items of various kinds to maintain a column in each issue.

The aim of a company publication should be to create a spirit of loyalty, fraternity and unity of purpose; that purpose being the success of each employee through the results he produces for his employer.

Jack-in-the-Pulpit Is Succeeding the Shrinking Violet*

Railways Should Publish the Facts on Transportation so That the Public Will Not Be Misled—How to Advertise

By Labert St. Clair

Director of Advertising Section, American Electric Railway Association

OLD Doc Coué has sounded a splendid motto for the country in general and electric railway men in particular. Every day in every way things are getting better and better with us. One sign of this is that the shrinking-violet type of electric railway manager is disappearing and the jack-in-the-pulpit type is taking his place. Electric railway managers all over the United States are standing up in public and informing the riding public about themselves and their problems.

This is the attitude that all electric railway managements should take. It is not only the proper one from the standpoint of his protection but it is a duty to the public.

Any electric railway man who cares two whoops for the future of his community is going to fight hard against the forces that oppose him because these forces almost invariably are the ones which would hinder the prosperity of every city.

The electric railway man is constructive because he has a permanent investment and intends to stay on the job in his home city. His opponents usually are people who have no investments to speak of and are concerned only in their own personal welfare. They are perfectly willing to destroy every other business in the city if there is any opportunity that they may be able to vault into prosperity over the remains of legitimate business.

If you doubt this, consider for a moment the three chief forces that work against the prosperity of street railways.

Forces Opposed to Electric Railways

One of the primary forces is the demagogic politician. His stock in trade always is attack. You never hear him talking about building up street railway service. He concerns himself solely with a discussion of lowering the fare, which, as everyone knows, naturally must result in decreased efficiency of service. Fortunately, owing to the protection thrown about utilities by commissions and the courts, he seldom is able to wreck service entirely but by his blatherings he can frighten away investors and thus retard the improvement of service greatly. Every politician knows that a city cannot be built up under less than a fair fare, but he doesn't take this into consideration when he makes his anti-utility campaigns. The one object he has in mind is to get into office.

Another great force in opposition to electric railways is the sensational newspaper. Anyone who knows the least thing about the newspaper business—and I speak from more than fifteen years' experience in it—is aware that the only reason our yellow press has for fighting honestly conducted electric railways is that they want to gain circulation. They realize that their class of readers are not grounded in the fundamentals of economics and that it always is easy to please them by attacking businesses representing large investments. Therefore they continually seek to wreck electric railways by advocating less than a living fare and they always will, of course, unless by advertising and publicity electric railways expose the insincerity of these muckrakers. The fare never can be made low enough to suit such newspapers because the minute they quit advocating a lower fare their circulation will drop.

The third party to attack electric railway rates usually is the citizen who sincerely believes that it is possible for any electric railway to prosper on a lower fare than it is getting. He agitates the question because he is not informed.

It is easy to see that none of these three forces represents a constructive interest and that if permitted to proceed rampant they soon would wreck not only the electric railways but the general business of any community. For indeed, as experience has shown in Des Moines and elsewhere when electric railway service is wrecked, all other businesses suffer greatly.

Therefore I say it is the duty of every electric railway man as a good citizen, regardless of his personal or financial interest, to stand up and tell his story. Unless he does tell it in every possible way, the people will never know the truth and they cannot be blamed for accepting the biased, half-baked or wholly untruthful statements of politicians, sensational newspapers and sincere but uninformed citizens.

Advertising Necessary

No more sympathy is due the electric railway man who doesn't tell his story to the public and then gets in wrong with it than is due the merchant who goes bankrupt through failure to advertise his wares. Both are in exactly the same category. The merchant fails because he permits other merchants who are engaged in the same business to out-advertise him. The electric railway manager fails because he is out-advertised by his opponents. They sell more bad will for him than he sells good will and the result is that he goes out of business.

If you want to know the force of advertising and publicity in the electric railway business, all you have to do is to take a list of companies that are telling their stories to the public and those that are not and compare their financial and public relations situations. By this I do not mean that every company which is telling its story is enjoying prosperity, but I will assert that a greater percentage of those that are being frank with the public and carrying on continuous advertising campaigns are more prosperous than those that are sitting back and doing nothing. Furthermore, even the company which advertises and is not financially prosperous is storing up a supply of good will to be drawn on in the future. And good will inevitably will translate itself into prosperity.

About 80 per cent of the mileage of the electric railway industry now is represented by companies which advertise. Not enough of them, however, advertise continuously and use all medi-

*Abstract of address delivered at annual convention of Oklahoma Public Utilities Association, Oklahoma City, March 12-14.

ums in their possession. This is a great mistake because the public very quickly forgets.

If you don't believe this, think back fifteen years and try to recall what particular tooth wash was most in the public mind. It was Rubifoam, was it not? Yes, it was. Rubifoam in those days literally was on every tongue. Yet today you never hear of Rubifoam. Do you know the reason? It is simply this: The company making Rubifoam quit advertising. The same is true of any number of other articles which formerly were widely advertised in this country but are not advertised now. If the public mind will forget a commercial article when all it has to remember is simply a name, because there is a let-up in advertising, how much more quickly will it forget the detailed and, perhaps, somewhat complicated story of an electric railway?

Those, in brief, are the reasons why electric railway companies should advertise. Now let us turn for a moment to how to advertise.

How to Advertise

No industry or business in the world has such wonderful channels through which advertising may be moved cheaply as an electric railway. By virtue of having a vast force of salesmen on moving cars and excellent window space, racks and other facilities through which to display and move advertising matter, the electric railways have a decided advantage over any other business in the world. Of course, they can and should, in common with all other businesses, also use the newspapers. I am a strong advocate of paid newspaper advertising, but in addition to newspaper space they have unparalleled space of their own which they can use at a very small cost.

It is decidedly advantageous, if you can afford it, to have an advertising man, but if you cannot afford one, do not despair. There is not an electric railway executive in the United States who cannot write advertising if he will just sit down and do it.

It is useless, however, to begin advertising or publicity work until you are absolutely certain that you are rendering the best possible service under the circumstances and are willing to court legitimate inquiry into your operation. To determine whether this situation exists or not, it behooves every management to ask itself these questions.

Am I courteous toward and accessible to the public and my employees?

Do I really hear what the public is thinking about my management, or am I simply being told the things I like to hear?

Are all of my employees and I making the most of every opportunity to create good will surplus, or are we just "getting by"?

Until these questions can be answered in the affirmative, without mental or other reservation, it is virtually useless for any management to enter upon printed advertising.

A company may advertise until the cows come home, emphasizing its desire to serve, but if this friendly and cordial attitude is not reflected in the actions and voices of the organization from the manager down to the lowest paid employee, its advertising cannot net maximum returns.

The easiest and best way to prepare advertising copy is to write your story just as you would tell it if you had your friend Bill Jones across the table from you and were trying to sell him the proposition which you want to sell the general public. Once you have gotten Bill Jones facing you, theoretically, and have begun to prepare your proposition for the public in the same clear, simple, honest fashion that you would present it to Bill, you are on the way to success.

After that your chief problem will be to select the best mediums through which to present your message to the public.

Indicate to the advertising solicitor or the printer with whom you do business that you welcome suggestion and advice on the preparation of your material and you will find that he can be of a great deal of help to you. It is his business to know how to effect the best possible typographical display of your message.

Base your advertising plea on service to the car rider. Don't weep. Don't try to excite pity for your company. Sell your goods on merit.

Above all, build on and with facts. From start to finish, hammer home the truth. If your opponent lies about you, don't say he lies; show by facts that he lies. Don't get huffy and explode. You can't lay bricks and throw mud at the same time. If the truth is on your side, you will win in the end, but you wouldn't hasten the end by any method but that of giving facts. And don't merely buy advertising; invest in advertising, because advertising correctly used pays big dividends in good will.

U. S. Chamber of Commerce

THE program of the annual meeting of the Chamber of Commerce, of the United States to be held in New York on May 7-10, has been made public. As already announced, the general subject will be transportation. On Monday, May 7, there will be meetings of the national councillors and the general meetings will be held on the following day, as follows:

Tuesday May 8

11:00 a. m. General meeting. President's address.

1:00 p. m. Luncheons and meetings of the following groups: Civic Development, Domestic Distribution, Fabricated Production, Finance, Transportation and Communication.

8:00 p. m. General meeting—Topic: "European Conditions from the American Viewpoint."

Wednesday, May 9

10:00 a.m. General meeting. Topic: "Developing a National System of Rail, Water and Highway Transportation." Consideration of resolutions.

1:00 p.m. Luncheons and Meetings of the following groups: Foreign Commerce, Insurance, Natural Resources Production, Transportation and Communication.

6:00 p.m. Dinner of the National Association of Commercial Organization Secretaries.

6:00 p.m. Dinner of the American Trade Association Executives.

8:00 p.m. Representatives and members will be guests of the New York committee at the Hippodrome.

Thursday, May 10

10:00 a.m. General meeting. Topics: "The Farmers' Interest in Transportation," "Financial Support for the Railroad," and "The Re-establishment of Railroad Credit."

2:30 p.m. General meeting. Topic: "Railroads and the Government." Report of the committee on the nomination and election of officers and directors. Final action on resolutions.

8:30 p.m. General meeting at the Hippodrome, to be addressed by an outstanding leader of world affairs.

On Friday, May 11, there will be a trip to West Point.

For the general sessions held on Tuesday and Wednesday morning, Thursday morning and afternoon, and Tuesday and Thursday evenings the most prominent authorities of the country upon transportation questions will be secured, including at least one representative from the President's Cabinet. President Barnes will himself open the subject of discussion in his annual address.

In addition to the annual meeting the chamber has appointed five special committees to take up a study of different phases of the transportation problem. They will report to a general committee representative of all interests. By the time the annual meeting is held it is expected that the investigations will have advanced to a point where important announcements of progress can be submitted.

Oklahoma Association Meets

THE Oklahoma Utilities Association held its fifth annual convention at Oklahoma City on March 12, 13 and 14. A paper presented by Labert St. Clair on the subject of informing the public appears elsewhere in this issue. B. Hilburn, manager Tulsa Street Railway, presented an interesting paper on the experience which the railway company in Tulsa has had in going into the bus business. He was unable as yet to draw definite conclusions about the outcome of the plan. This paper will be published in an early issue of *Bus Transportation*. D. C. Green, vice-president and general manager, Fort Smith Light & Traction Company, Fort Smith, Ark., presented a paper on "The Merits of the Weekly Pass," which will be treated in a later issue of this paper.

E. F. McKay of the Oklahoma Corporation Commission, called attention

to the fact that utility commission powers are exclusive and not inclusive, since these powers are fixed by law and any case with which the commission is allowed to deal must possess a definite interest for the public. He pointed out that commissions have no arbitrary powers.

Martin J. Insull emphasized the primary importance of the public relations work of the utility companies. Without disparagement of the technical and operating forces in the utility field, he said that confidence in utilities on the part of the public is necessary before the technical and operating talent can have full play in establishing the service the public wants.

Charles B. Scott, Chicago Safety Bureau, urged that the utilities in any community should not only participate, but take the initiative in community safety work. The first essential in making safety work a success is the interest of the company management; the second most important thing is the interest of the supervisory forces, and the third, a definite plan and organization.

General George H. Harries in an address expressed the belief that ill-considered utility regulation is largely a thing of the past, and that regulatory commissions are now on the same plane as courts of justice and realize their obligation to see that both the public and the utilities receive just treatment.

The officers of the association for last year were re-elected for the coming year as follows: President, Fred W. Insull; first vice-president, Sherman Mooter; second vice-president, J. C. Chestnut; treasurer, William Mee. O. D. Hall, who has been acting secretary, was appointed manager.

New England Club Banquet Attended by 600

AT ITS twenty-third annual banquet, which was held at the Copley-Plaza Hotel on the evening of March 22, the New England Street Railway Club had an attendance of about 600. President Potter reported the year had been successful and referred particularly to the February meeting as most helpful. He reported that there are now 805 members, or seventeen more than last year. Speaking of competition, he said the bus is here to stay but it can be operated more economically by the railway companies than by outside interests. He suggested as a topic for an early meeting, stock ownership of electric railway companies by employees. He explained that the newly-elected president, R. D. Hood, was prevented by illness from attending the meeting but predicted a successful year under his guidance.

Under the leadership of Alonzo R. Williams, Providence, three cheers were given for Mr. Potter and repeated for Mr. Hood.

George W. Gardiner was then introduced as toastmaster and officiated most acceptably during the evening.

Governor Channing H. Cox was not able to be present but was represented by Frederick Cook, Secretary of State of Massachusetts. Mr. Cook declared the Governor was greatly interested in the subject of transportation. He referred to the recent report and recommendations of the Massachusetts Department of Public Utilities and to the constructive work of Matthew Brush, former president of the Boston Elevated, in helping to bring about the present trustee plan. He also declared industries were absolutely dependent upon the proper functioning of the utilities.

Mayor James M. Curley, the next speaker, commended the administration of the Boston Elevated by the public trustees, and said the public understood the need for co-operation with utilities better than ever before. He said Boston industrially was in good condition but hampered by unfair freight differentials imposed by the Interstate Commerce Commission. Dr. William H. P. Faunce spoke along the lines of a broader national vision. Science, he declared, has brought all parts of the world near in the physical sense. America's work is to help toward a better international understanding and so advance civilization. Robert H. Newcomb, the final speaker, declared that many of the problems of steam and electric roads were alike, such as increased costs, retarded fare increases, and liability to attacks for political purposes. These could be overcome only through better public relations brought about by education. He considered the transportation department the headquarters for disseminating this information, and gave examples of commendations which followed the proper kind of action by station agents. This policy is winning out on the Boston & Maine Railroad.

At the annual meeting in the afternoon the ticket submitted by the nominating committee was elected as follows:

President: Ralph D. Hood, Haverhill, Mass.

Vice-presidents: L. D. Pellissier, Holyoke, Mass.; N. J. Scott, Hartford, Conn.; T. H. Kendrigan, Manchester, N. H.; T. B. Jones, Burlington, Vt.; Fred D. Gordon, Portland, Me.; Edward A. Brown, Newport, R. I.

Secretary: John W. Belling, Boston, Mass.

Treasurer: Fred F. Stockwell, Cambridge, Mass.

Executive committee: A. E. Potter, Charles H. Wood, W. W. Field, Howard F. Fritch, George H. Martin, George H. McFee and H. M. Flander.

Finance committee: R. D. Hood, W. C. Bolt and H. B. Potter.

Fifty Billions in Transportation

Investment in Highway Transport Almost Equals That in Railroads—Growth of Investment in Various Transport Facilities Compared

IN A paper presented before the New York Railroad Club on March 17 J. Rowland Bibbins, consulting engineer, Washington, D. C., made a very interesting comparison of the present investment in the transportation facilities of the nation and laid great stress upon the need for a proper co-ordination of the whole transport mechanism, including rail, shipping, barge, trolley, motor and airplane. He showed that the transportation industry now represents an investment of $50,000,000,000. This is divided approximately as follows: Railroads, two-fifths; highways and motor transport, two-fifths; electric railways, one-tenth; merchant marine, canals and port facilities, one-tenth. Using the basic rail tonnage as the best index of growth, Mr. Bibbins pointed out that the tonnage has increased at the rate of the 2.6 power of the population. He said that if it were possible to press a magic button and double the present facilities for handling rail tonnage, these facilities would last perhaps only fifteen years.

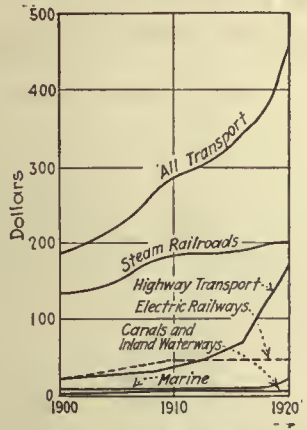


Component parts of the $50,000,000,000 transportation industry

The speaker called particular attention to the fact that in the last decade motor transport has commanded nearly four times as much new capital input as the railroads, nearly sixteen billion dollars, while during the preceding decade ending 1910, the reverse was practically true—two billion for highways as against six and one-half billion for railroads. During the last decade motor transport has called for over two-thirds of the new capital input of the whole transport system. The total transport investment today amounts to over $1,200 for each of the 41,000,000 wage earners of the United States. This tremendous growth in the last decade has brought transportation up to the point in investment that it is second only to agriculture, which represents $80,000,000,000. It exceeds manufacturing, which is a $45,000,000,000 industry.

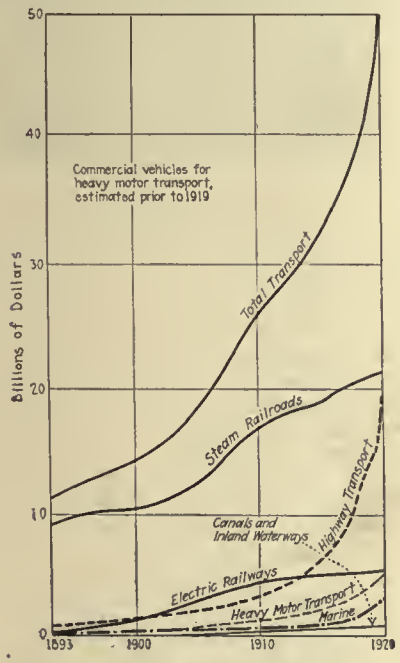
Emphasis was laid upon the need of a new broad study of ways and means for welding all of the transportation

services into a unit operation, i.e., through transport from producer to consumer. It costs as much to handle our tonnage to and from a railroad as it



Growth of Various Transportation Facilities Since the Chicago World's Fair

does to haul it between stations. Moreover half of the railroad investment, or $10,000,000,000, has been spent in providing other than main line facilities. The terminal problem is thus the most important problem before the country, perhaps second only to line consolidation. Mr. Bibbins said that collection and delivery in our cities are the most important details. The public does not realize that practically all railroad freight other than coal, ores, etc., handled by carload direct has to pass over streets and highways one or more times, according to the number of fabrications involved in the manufacture and sale. The great question is whether it should be handled by vast fleets of unorganized, unstandardized, unregulated and partly loaded vehicles, or by a more scientific delivery system, efficiently financed, operated and scheduled.



Per Capita Investment in Transportation

American Association News

Letter Describes Conditions of Coffin Award

THE committee of the American Electric Railway Association, composed of C. D. Emmons, Britton I. Budd, James H. McGraw, J. G. Barry and A. H. Jackson, which has charge of the Charles A. Coffin Foundation award in the electric railway field has sent out a letter to all electric railway companies informing them of the conditions of the contest and urging them to participate.

The letter follows:

AMERICAN ELECTRIC RAILWAY ASSOCIATION

Office of the President

MARCH 19, 1923.

To Electric Railway Companies
in the United States:

The General Electric Company has created and announced the Charles A. Coffin Foundation, the income from which will be devoted to the annual award of prizes for encouragement and in recognition of special services in the electric field.

Detailed information as to prizes under this Foundation is presented in the attached pamphlet entitled Charles A. Coffin Foundation, issued by the General Electric Company.

The announcement, in so far as it refers to the electric railway industry, provides for an annual award of the Charles A. Coffin Medal to that electric railway company within the United States which during the year has made the greatest contribution toward increasing the advantages of electric transportation for the convenience and well-being of the public and for the benefit of the industry.

The company receiving the medal will also receive $1,000 for its Employees' Benefit or a similar fund.

Every electric railway company in the United States is invited to participate and urged to send to the committee a representation of its activities and accomplishments covered by the field of the award.

The committee suggests that among the factors which will be considered in making the award are the following:

1. The particular initiative, skill and enterprise manifested in popularizing electric railway service—more riders and more revenue.
2. Outstanding success in gaining public good will.
3. Economies which have been introduced in operation resulting from original ideas.
4. Economies in operation viewed as a measure of the extent to which the company has taken advantage of new developments in operating and maintenance practice and equipment, originating with others.
5. Improvements in construction practice which have resulted in reduced first cost, reduced maintenance, or greater reliability of service.
6. Particular success in conducting a safety program and actually reducing the number and seriousness of accidents.
7. Outstanding accomplishment in development of good relations between management and employees.
8. Special accomplishment, aside from good management, tending to reduce the cost of new capital.

The first award of both the medal and the $1,000 for employees' benefit or other similar fund will be made for the year commencing Aug. 15, 1922, and ending Aug. 15, 1923. The announcement of this award will be made at the annual convention of the American Electric Railway Association, at can Electric Railway Association, which will be held at Atlantic City in October, 1923.

All statements must be in the hands of the committee by Aug. 15, 1923.

Kindly address these to Charles A. Coffin Prize Committee of the American Electric Railway Association, 8 West Fortieth Street, New York City.

Very truly yours,

C. D. EMMONS,
Chairman.

Equipment Committee Holds Busy Session

THE equipment committee of the Engineering Association held a two-day session at the association headquarters in New York City on March 19 and 20. Those present were F. H. Miller, Louisville, Ky., chairman; Daniel Durie, Connellsville, Pa., sponsor; Walter S. Adams, Philadelphia, Pa.; Charles Gordon, Chicago, Ill.; J. L. Gould, Wilmington, Del.; George Hazlewood, Philadelphia, Pa.; J. M. Hipple, Pittsburgh, Pa.; P. V. C. See, Akron, Ohio, and C. W. Squier, New York, N. Y. In addition, G. L. Schemerhorn represented E. D. Priest, Schenectady, N. Y., and H. G. Ross represented E. S. Sawtelle, Cincinnati, Ohio.

Most of the time was taken up by meetings and discussions of the several sub-committees, which went over the work already accomplished, made recommendations as far as possible and outlined work which was still to be taken care of. Subcommittee No. 1, on motor gearing, has sent out a questionnaire and received some replies. The replies received were tabulated for detailed consideration. The standardization of web holes in gears is to be undertaken by this committee.

Sub-committee No. 2, which is making a study of various devices for trolley contact, outlined a questionnaire which will be sent to operating officials to collect additional information. All the existing standards on equipment were gone over by sub-committee No. 3, and definite recommendations were made for revision as was found necessary.

This subject has developed into a very broad one, which will require much attention by the members of the committee during the rest of the year. Sub-committee No. 4, which is making a study of spring supports for railway motors, reported the results and information so far obtained and outlined additional work which will be undertaken before the final report is made. Suggested designs for dust guards were presented by sub-committee No. 5, and drawings of these will be made for including in the final report.

Maintenance of Equipment

Reconstruction of Sacramento Cars for One-Man Operation

THE recent reconstruction of nine two-man cars at Sacramento, Calif., into a type safely and effectively operable by one man has been wholly successful, according to company reports. These cars are operated by two men during the rush hours and when the traffic thins out the rear end is closed up and the car is operated by one man on the pay-as-you-enter plan.

The Sacramento system, which is owned and operated by the Pacific Gas & Electric Company of San Francisco, bought four Birney safety cars in 1916. These proved so useful that six more of the same general type were purchased in November, 1920. Success with these cars led to the decision to reconstruct a few of the double-truck cars from the open, double-end type to a type that could be operated either by one or two men. This would give the equipment more flexibility, and would enable the company more accurately to serve local transportation needs.

Accordingly, nine cars have been reconstructed in the Sacramento shops of the company and equipped with all the safety devices in use on the one-man cars. As a part of this change modern pneumatic brakes were substituted for the unique type of hand brake previously used. (See ELECTRIC RAILWAY JOURNAL, August 19, 1916, page 325).

When the reconstructed cars are operated by one man the rear ends will be closed so that entrance and exit can be made only at the forward end where the operator is stationed. Separate passageways are provided to allow passengers to enter and leave the cars at the same time. When the cars are in operation all doors are locked and, as in the Birney car, at any time in the operation of the car that the controller handle is released, the brakes are applied, the track is sanded and the doors are opened. Illuminated destination signs of local design are provided on both ends of the new cars.

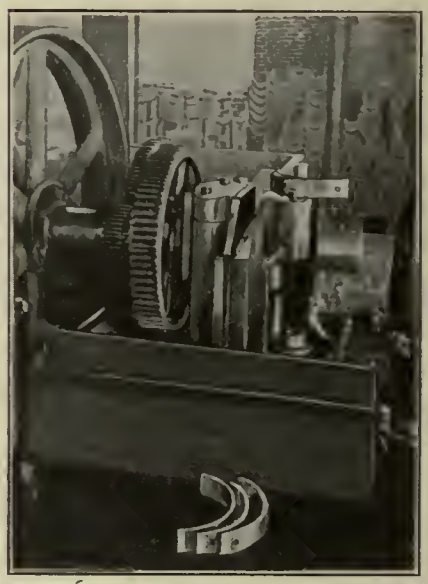
Claims which the company makes for the advantages of the reconstructed cars are as follows:

1. Elimination of public criticism through replacing rope brakes with air brakes.
2. Absolute safety to passengers through installation of safety devices.
3. Rounded ends instead of square, resulting in improved appearance and more comfort to motormen in cold weather.
4. Double doors in front, allowing passengers to get off and on at the same time when the car is operated by one man, thus saving time.
5. When operated with one man all doors are locked and cannot be opened until car is stopped.
6. Illuminated destination sign on top of car which is plainly visible day or night; view cannot be obstructed by any kind of vehicular traffic.
7. Steps folded, except when doors are open, resulting in easier operation through congested traffic and reduction of step collisions, generally quite common.



Double-Truck Car as Reconstructed for One-Man Operation at Sacramento

Curving Controller Segments



This Machine Bends Controller Segment Copper With Speed and Accuracy

AN EFFECTIVE scheme which is used in the shops of the United Electric Railways, Providence, R. I., for curving copper strips for controller segments is as follows:

A heavy spindle, mounted in substantial bearings, carries a short knurled cylinder which revolves, with clearance slightly less than the thickness of the segment copper, above a smooth cylindrical die or shoe. The latter is between a third and a half of a complete circumference in circumferential length. The operation of curving the copper consists in feeding it into the space between the knurled cylinder and the die as the spindle revolves slowly. Stout stationary guides confine the strip to its proper position along the spindle. The machine and samples of the

work are shown in the accompanying illustration. It will be noted that the spindle is back-geared to reduce the speed and increase the torque.

Bending Test Breaks Rail Outside of Weld



View of Broken Rail

THE accompanying illustration shows the result of a rail bending test made last fall on Thermit welded rail by the Washington Railway & Electric Company, Washington, D. C. During the test, pressure was applied directly against the side of the weld. As shown, the rail broke entirely outside of the weld.

Making It Easy to Keep Trolley Poles Painted

IN ITS shops at Fall River the Eastern Massachusetts Street Railway uses the following plan to encourage maintenance men to keep trolley poles painted: A couple of paint pots are mounted on a column at a height and in a position convenient of access to a man on the roof of a car. Thus when an inspector is examining the poles, wheels, trolley bases, etc., he can easily give the pole a coat of paint if it needs it.

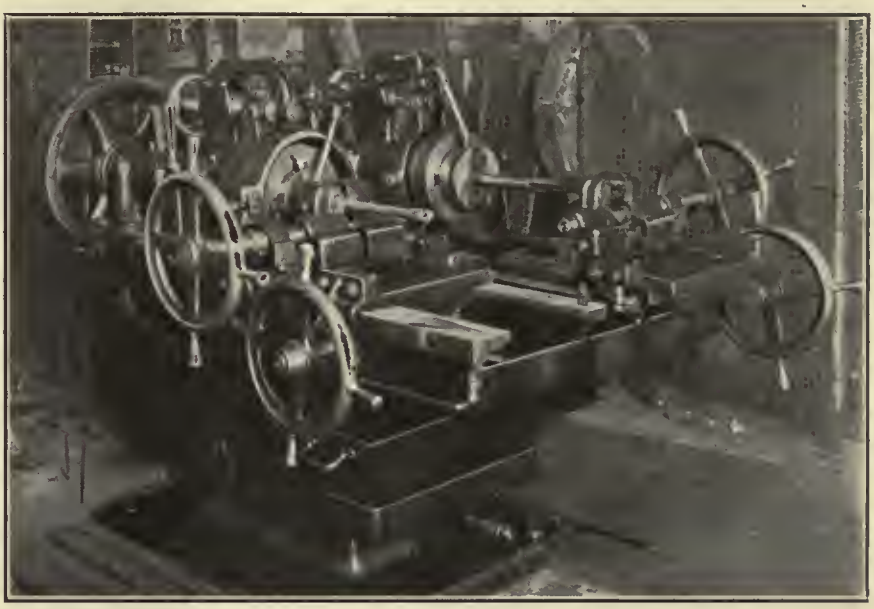
Gains from Power-Saving Recorders

IN JULY, 1919, the Springfield Street Railway was equipped with Arthur power-saving recorders on all cars except service cars, and in October, 1920, the Worcester Consolidated Street Railway was equipped with the same device. In the Oct. 15, 1921, issue of this paper C. Verner Wood, the supervisor of power saving for both companies, gave an estimate of net savings for these recorders. Figures up to Dec. 1, 1922, as estimated by Mr. Wood follow:

	Springfield	Worcester	Total
Number of recorders	282	388	670
All costs of operation, including interest and depreciation	$32,607.13	$16,202.62	$48,809.75
Gross saving	60,398.31	36,043.86	96,442.17
Net saving	$27,791.18	$19,841.24	$47,632.42

Machine for Threading Rods Is a Great Convenience

IN SPEAKING of the usefulness of various machine tools, C. P. Westlake, supervisor of equipment of the Eighth Avenue Railroad, New York, N. Y., considers his Acme bolt machine as one of the greatest conveniences he has in the machine shop. The accompanying illustration shows the machine in operation threading some rods for door operating equipment. The modern electric railway car contains a large number of rods of various character which have to be threaded, and the use of such a machine speeds up maintenance repairs and results in considerable economy.



Bolt Cutter in Use by Eighth Avenue Railroad

Emergency Light for Door-Inclosed Ramp

THE overhauling shop of the New York & Harlem Railroad, New York, N. Y., is on the second floor of the shop building, and in order to bring cars into the shop they must be operated up a long 12 per cent ramp. In order to keep the shop heated both ends of this ramp are closed by curtain type doors, which are moved up and down by a small motor as required. Difficulty was experienced from motormen starting up this ramp while the doors at the upper end were closed or partly closed. Also the proper clearance for cars requires that the doors be fully raised, and if they were left otherwise there was danger of interference.

To provide a danger signal to indicate whenever the doors were partly closed circuits of lights have been installed around the opening and the current to these lights is controlled through a switch which is operated by the movement of the doors. The lamps are red, to indicate danger, and a slight movement of the door downward causes them to light at both ends of the incline, so that the motorman can be certain before he starts up the incline that the doors at the other end are in proper position so that no interference will occur.

Car Record Board Keeps Mileages for Mechanical Department

A RECORD board kept by the mechanical department at the Geary Street carhouse of the San Francisco Municipal Railway shows each day's car-hour record and, for the convenience of platform men, indicates the track on which the individual cars are stored awaiting their runs. The board is therefore consulted by each platform man as he comes on duty.

Records are taken off the board daily by an inspector in the mechanical department, who enters in his record book the number of car-hours each car was in service. Each car-hour is taken as the equivalent of 10 miles of travel and in order thoroughly to wash and inspect the rolling stock every 2,000 miles it is only necessary to schedule the cars for this attention after each 200 hours of service.

The record board is laid off in sections of five columns each. These columns are devoted successively to route, time of departure from carhouse, time of return to carhouse, number of car, track where car is stored. The two columns last named are ordinarily the only records changed from day to day. About 5 p.m. daily, when the last outbound car of the day has left, the records for the day are entered in the record book and these last two columns are erased. The car locations and assignments for the next day's program are filled in by the night carhouse foreman. When any change is made in the time allotted for each run, or in the exact routing specified, the mechanical department is notified and the listing on the board is changed at the time that the new schedule is put into effect.

Although the plan was developed by the mechanical department for its own records, the method of posting has proved so convenient to the operating department that the board is now the official bulletin for all daily car operating records.



A Corner of One of the 4x8-Ft. Schedule Boards

Three boards are ordinarily used, one for Monday to Friday, inclusive, and one each for Saturdays and Sundays. An extra board serves for holidays or special occasions. All three are common blackboards, 4 x 8 ft. in size, and are hung on the carhouse walls in a convenient location near the front entrance.

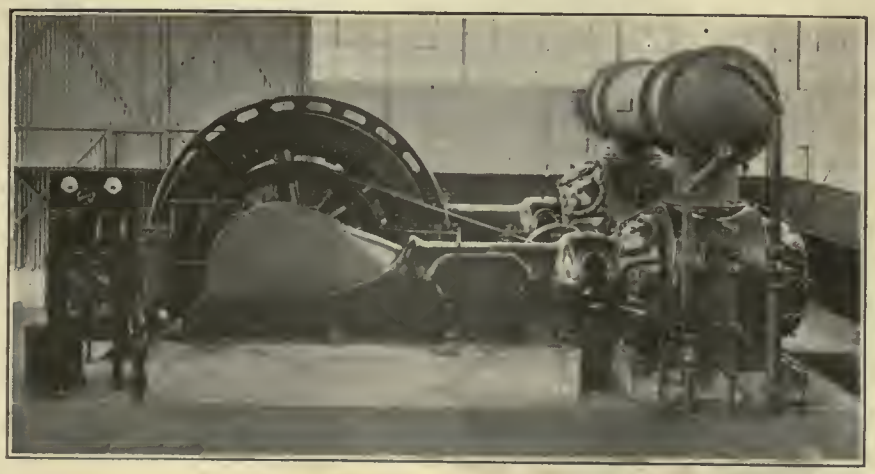
The London Underground Railways is now installing automatic railway ticket machines in theaters and department stores adjacent to the Underground stations.

New Equipment Available

Improvements in Shop Compressors

NUMEROUS improvements have been made in Ingersoll-Rand shop compressors during the past year. The new line of small air compressors known as "Type Fifteen" deliver "oil free" air and have overcome the lubrication troubles encountered in the smaller single-acting vertical compressors employing the crank-case splash lubrication system. These may be used in any of the standard types of drives, also, if desired, with constant speed unloaders which maintain the reservoir pressure within a definite range.

Duplex compressors of medium size arranged for either belt or direct connected motor drive have been equipped with the patented five-step clearance control system of regulation which has been so satisfactory on large direct-connected motor-driven units.



Recent Shop Compressor Installation

This application of clearance control presents for the first time an efficient and graduating capacity for medium size belt-driven compressors. With the five-step clearance control the unloading is entirely automatic, a compressor operating at full, ¾, ½, ¼ or no load as required in order to maintain the desired air pressure in the system.

Reduction in power secured with this method of control is practically in direct proportion to the quantity of air delivered to the compressor. Inasmuch as there is nothing more important in compressor operation than its system of regulation, this improvement marks one of the most distinct advances in compressor practice. It makes possible the operation of compressors with efficiency at full as well as partial loads, in contrast to the older types of regulation where the air load is either all off or all on.

This past year has also witnessed the introduction of a new and distinct type of direct-connected oil-engine-driven two-stage compressors known as the Price type POC oil engine compressors.

The unit of which the 100-hp. engine forms the prime mover has the air cylinder in line with the power cylinder but on the opposite side of the crankshaft. For 100-lb. pressure, a two-stage air cylinder is offered. The air intercooler is mounted below the air cylinder and forms a support therefor.

The general impression which is given by the unit is one of symmetry, compactness and durability. For air pressures less than 100 lb., a single stage air cylinder is offered, which is connected to the oil engine frame by a distance piece. For both single and two-stage work the air cylinder is double-acting, which has contributed to the exceptional balance of the machine.

In the 50-hp. size, the air cylinder is vertical and is mounted on top of the engine, immediately above the crankshaft. By so doing, it has been made possible to mount the unit on a flat car or truck for use in portable work. It is interesting to note that this construction has not resulted in excessive height, this having been kept less than 8½ ft.

Still another improvement is the building of steam-driven compressors equipped with piston steam valves and automatic cut-off governor for capacities up to 5,000 cu.ft. of free air per minute on compressors of two stages with 100 lb. of discharge pressure.

The News of the Industry

See Promise in Accomplishments

Both Detroit Candidates Alive to City's Transportation Needs—City Council Unanimously Votes Bond Resubmission

Frank E. Doremus and Dr. James Inches were nominated at the March primaries as candidates for Mayor of Detroit. Both see promises in the achievements to date of the Detroit Municipal Railway. Mr. Doremus has represented the Detroit district in Congress for ten years. If the municipal railway is to be a success, according to Mr. Doremus, two things are necessary, horse sense and patience. The surface railway, rapid transit, sanitation and other municipal problems can be met, he believes, with the co-operation of citizens.

Mr. Doremus in reviewing the history of the city's transactions emphasized the fact that the D. U. R.'s system taken over by the city is to be paid for in ten years—the sum being $19,850,000. This he believes is a big undertaking for such a short time, where the sum is to be paid out of the earnings. He thinks the city has made a most creditable showing in paying out of earnings, the $500,000 which was due in December, 1922, $500,000 which was not due until June, 1923, and $200,000 not due until December, 1923, and at the same time paying pro rata shares to the sinking fund to retire the $19,000,000 bond issues. The people are urged, no matter how they may have stood originally on the question of municipal ownership, to put their shoulders to the wheel and to co-operate in making the system a success.

Both candidates see the need of rapid transit eventually but no definite measures are recommended at the present time. Under the existing laws, rapid transit would have to be paid for out of earnings, which is considered practically impossible. The Culver bill now pending before the State Legislature is cited as providing for the construction of a rapid transit system through bond issue to be retired out of taxation. In either course caution is urged.

The City Council has unanimously resolved to resubmit to the voters the question of authorizing the $5,000,000 bonds for the purpose of making extensions and betterments. This will be done at the April 2 election.

Indiana Hard Hit by Storm

City and interurban railways in Indiana are trying to estimate their losses from the recent wind and rain storm which swept over the State. The losses were particularly severe in southern Indiana. At times the velocity of the wind was as high as 66 m.p.h., and seldom did the wind die down to 50 miles. The Indianapolis Street Railway was compelled to suspend service on several lines for hours while debris was cleared from the streets and the wire re-strung. Service was suspended on the Shelbyville division of the Indianapolis & Cincinnati Traction Company most of one day. More than 3 miles of poles and trolley wires were down in one section of the Interstate Public Service Company's lines south of Indianapolis. The Lafayette and the Crawfordsville divisions of the Terre Haute, Indianapolis & Eastern Traction Company had to suspend service into Indianapolis. Street car and interurban traffic about Muncie was paralyzed because of a breakdown in the Anderson power plant of the Union Traction Company. Electric railway service in South Bend was crippled.

Orders Separate Cars

Ordinance Requires Birmingham Railway to Equip Cars After Jim Crow Law—Will Cost Company Large Sum of Money

SEPARATE cars or compartments with separate entrances for white and negro passengers must be provided upon every electric railway operated in the city of Birmingham, Ala., according to the terms of an ordinance adopted by the City Commission on March 13. Thirty days before the ordinance takes effect. The ordinance is modeled after the Jim Crow laws, which it is stated, have been sustained in the courts.

Compliance with the terms of the ordinance will cost the Birmingham Railway Light & Power Company approximately $750,000 and will affect practically every car in service on the various lines in Birmingham, according to the statement of J. S. Pevear, president and co-receiver of the company. He also declared that it would take approximately ten months to put the equipment of the company in condition to conform to the ordinance and give service.

If the ordinance is enforced sixty cars of the one-man safety type will have to be taken off of the lines in Birmingham and forty of them cannot be rebuilt to meet the terms of the ordinance, according to a statement of Mr. Pevear made immediately following the adoption of the ordinance. Loss of seating capacity amounting to from 15 to 20 per cent on other cars due to the installation of the partitions required by the ordinance will result, according to Mr. Pevear's statement. He declared that the purchase of fifty-five to sixty new cars of the larger type will be made necessary if the ordinance is enforced.

Members of the City Commission have declared that the ordinance is to be enforced. However, some of them have indicated that if necessary the company may be given more time than is provided in the ordinance as adopted.

Action by the commission followed a fight which has been in progress at intervals for several months for the elimination of the one-man cars and pay-as-you-enter cars on several lines in the city. Vigorous protests were filed by numbers of citizens against the intermingling of the races in entering and leaving the single-entrance cars.

Introduction of the ordinance followed quickly after an opinion of Assistant Attorney General Hugh White holding that the Alabama Public Service Commission, with which petitions had been filed by a number of citizens, did not have jurisdiction over the separation of the races on street cars, but that this jurisdiction was left in the hands of the state and cities of the state under the police powers.

In discussions of the matter it has been indicated that complete enforcement of the ordinance will be felt more keenly on the lines on which one-man cars have been operated. It was indicated that the company may take the attitude that it should not take large cars off its long lines, which have little jitney competition, to place them on the short lines where the one-man cars, in most cases, have been operating in competition with jitneys. However, no official statement on this point has been forthcoming.

The controversy over the pay-as-you-enter or single-entrance cars in Birmingham dates back a number of years. One or two previous efforts have been made by the company to introduce such cars on its lines but met with opposition from the public and earlier efforts were abandoned. One-man cars were introduced for the first time just at the close of the war, when the system was threatened with a complete breakdown in transportation, and at the same time the City Commission agreed to an increase in the fare.

Following a try-out of one-man cars on the Lakeview and Highland Avenue lines with an improvement in service they were introduced on the Loop lines and later on other lines. Shortly after this pay-as-you-enter cars were put in operation on several lines.

A number of years ago most of the

cars operated in Birmingham had separate compartments for white and colored passengers or separate trailers for negroes. Later there was a movable partition and for several years past white and colored passengers in the cars have been separated by movable boards fixed to the top of the seat backs at the division point in the car.

The first fight against the pay-as-you-enter cars, which finally developed into the fight for the Jim Crow law just adopted, came from the North Birmingham line. The Acipco line was quickly involved. Both these lines serve an industrial territory and at times carry large numbers of negroes. There were several conferences between city officials and officials of the company, while citizens held some mass meetings. The negotiations finally resulted in the abandonment of the pay-as-you-enter system on these two lines about eight months ago.

CITY INFORMED OF COST TO RAILWAY

A few weeks ago a petition signed by 250 patrons of the Norwood line, which operates one-man cars, was filed with the Commissioner of Public Utilities. The following day a petition was filed with 200 signers from the Fountain Heights line, also a one-man car line. A conference between company officials and the Commissioner of Public Utilities was held and the matter was taken up with Judge W. I. Grubb, of the United States District Court, and the city was informed that the company could not abandon its safety cars on these two lines as it would cost a considerable sum to replace them with larger cars provided with separate entrances.

Petitions, which had been filed with the Commissioner of Public Utilities, were forwarded to Montgomery and filed with the Alabama Public Service Commission and an early ruling was asked. The matter was referred to the attorney general's department for an opinion. A few days ago Assistant Attorney General White rendered the opinion that the question involved is not one of service but of the segregation of races on the cars. He held that the Public Service Commission did not have jurisdiction, but that the jurisdiction was with the city of Birmingham and other cities of the state.

During the negotiations over the change in the system on the North Birmingham and Acipco lines the Jim Crow ordinance had been prepared by the city legal department but was not introduced, the settlement having been effected before it came up for action before the commission.

CHAMBER OF COMMERCE OPPOSES THE ORDINANCE

Following the opinion of Mr. White that the city has full control of the situation, the ordinance was introduced at the regular meeting of the Commission Tuesday, March 13, and was unanimously adopted. There was a strong fight against the ordinance at the meeting by a large committee of the Chamber of Commerce, which opposed putting any additional burden on the street railway company, which has been in the hands of a receiver since the war period. A fight in favor of the ordinance was waged by a delegation of citizens.

A bill is now pending before the Alabama Legislature amending the state Jim Crow law to make it apply to all street railway lines in the state. The bill was introduced before the Senate at its session a few weeks ago and is now pending before committees in both the house and senate. The Legislature will reconvene about the middle of July, and it is stated that there probably will be a lobby in Montgomery in the interest of this bill.

Pacific Electric Buses Being Delivered

Delivery is being made by the White Company, Cleveland, Ohio, on the order of seventy-one buses for the Pacific Electric Railway and ten for the Los Angeles Railway, referred to in the ELECTRIC RAILWAY JOURNAL for Feb. 24, page 345. Both orders call for Model 50 chassis, designed solely for passenger transportation. Some of the new buses, the railways have announced, will be jointly operated by the two street railway companies and others individually, but all will be used to supplement the street car and interurban service furnished by the two corporations in Southern California. The purchase price of the consignment of buses was about $550,000.

Incorporation of Company Not Opposed

A hearing was held in Providence, R. I., on March 20 before the Senate committee on corporations on a bill to incorporate the Westerly & Atlantic Traction Company. There was no opposition to the bill. The incorporators named in the bill are Robert W. Perkins, Norwich, Edward M. Day, Hartford, Charles B. Whittlesey, New London and Herbert W. Rathbun, Westerly.

The act authorizes the company to purchase or otherwise acquire all of the present line of railway in Washington county, now owned by the Shore Line Electric Railway including lines from Westerly to Watch Hill, to Ashaway in Hopkinton and to Pleasant View. Capital stock is fixed at $100,000 with the right of increasing this amount to not more than $500,000. The act provides further for the management of the property by not less than three nor more than nine directors, who must be stockholders.

Under the terms of the act all franchises, privileges etc., extended, or granted to the Norwich & Westerly Traction Company, the Ashaway & Westerly Railway or their successor, the Shore Line Electric Railway would be extended and granted to the Westerly & Atlantic Traction Company wherever such franchises and privileges remain in force.

Agreement Reached on Paving Terms

A fifty-year franchise has been granted to the Aurora, Plainfield & Joliet Railway through Plainfield by the village board. This ends a controversy which has extended more than a year with the paving program as its main issue. Under the terms of the new franchise the electric line is to complete the paving of Lockport Street along its right-of-way this season.

Whether the company does the remainder of the paving required by the village is contingent upon its gross income. Sixty per cent of all the gross income in excess of $137,500 is to be devoted to street improvement work until it is completed, but if the railroad's income falls below that figure it is automatically relieved from the responsibility and the village will be compelled to pay for such work as is done.

The controversy between the village and the railway began in July, 1921, when the company requested that it be allowed to use a substitute for brick or concrete in paving its tracks through Plainfield, as was required by the franchise then in force.

The village officials refused to grant the request, despite the plea of the electric line officials that the road was in financial difficulties and unable to pave with brick or concrete without incurring a deficit, as the cost of the work was estimated at $15,000.

In 1922 the railway flatly refused to do any paving at all because of its financial position, and in July the village council revoked its franchise and ordered the company to cease operating its cars. The railway refused to heed the order and several months later the village took legal action, citing officials of the road to appear in the circuit court to show by what authority it continued to operate its cars.

Preliminary proceedings were held, but the village council, apparently not desirous of destroying Plainfield's only means of railroad transportation, allowed the case to drop by not pressing the action. The case will now be dismissed.

R. A. Moore, general manager of the company, said:

> The new franchise is fair to us and very fair to the village, and we are glad to have reached a settlement. Work will be started on Lockport Street as soon as the weather gets settled. The paving will then be rushed to completion, costing us approximately $1,500.

Arbitration Board Appointed

A board of arbitration to determine whether or not Cleveland street car men are to receive 15 cents an hour increase in their pay, has been appointed. The street railway men's union is represented on the Board by Common Pleas Judge Frederick P. Walther, while the company's arbiter is Thomas P. Schmidt, a director in the railway company. Judge Walther and Mr. Schmidt have selected Fielder Sanders, formerly Cleveland's city street railway commissioner, to be the third arbitrator. Hearings on the men's demand for higher wages will be started next week.

Hearing on Bills Concluded

Legislative Committee of New York Body Concludes Sessions on Utility Measures Now Pending—Large Delegation of Representatives of Utilities Attends and Voices Opposition

The last of the big hearings on public utility regulatory legislation now before the Legislature of New York State took place at Albany on March 21. The hearing was presided over by Senator Jeremiah F. Twomey, chairman of the Senate committee on public service. The measures under discussion were:

The Twomey-McKee bill, (Senate Print No. 833) amending the general city law, in relation to ownership of public utilities.

The Twomey-O'Connor bill (Senate Print No. 834) amending the public service commission law in regard to membership and powers of the commission.

The Twomey-Bloch bill (Senate Print No. 835) amending the public service commission law generally, to conform with the other proposed measures.

The Walker-Rourke bill (Senate Print No. 881) the so called five-cent trolley fare bill.

The Walker-Cashmore bill (Senate Print No. 912) amending the stock corporation law by bringing holding traction companies under the provision of the public service commission law.

The Walker-Donohue bill (Senate Print No. 986) amending the public commission law, providing for municipal or city public utility or service commissions.

The opposition was heard first. It was presided over by Harry B. Weatherwax of the United Traction Company, Albany, ex-Democratic Senator T. Harvey Ferris of Utica, representing the New York Telephone Company, and Judge Daniel Kenefick of Buffalo, representing light and power interests.

The principal discussion centered around the municipal ownership, the 5-cent fare and the city public utility commission bills.

The first speaker, Lewis E. Carr, attorney for the United Traction Company, Albany, emphasized the fact that the real purpose of the three feature measures was to bring about municipal ownership; that the tendency of the State for thirty years up until 1907 had been drawing toward state regulatory measures by a central body and that regulation by fifty-nine cities of the State would result in fifty-nine different standards of regulation with no centralized governing body and that none of the measures embody any provision to promote a spirit of harmony among the various proposed city regulatory bodies. Local regulation of public utilities must result in throwing the utility into politics.

Mr. Carr emphasized the fact that in the 5-cent fare measure the clause which has been in the law since 1886 providing that the "legislature expressly reserves the right to regulate and reduce the rate of fare on any railroad constructed and operated wholly or in part under such chapter or under the provisions of this article, and the public service commission shall possess the same power to be exercised as prescribed in the public service commission law" is eliminated and in its place is substituted the language that "The public service commission is hereby divested of all power to increase the rate of fare specified in this section, and every order or regulation of the public service commission in force at the time this act takes effect permitting or prescribing a rate of fare in excess of that specified in this section is hereby abrogated and annulled."

Henry Killeen, Buffalo, representing the International Railway, made a bitter attack upon the incompetency of the present Buffalo city administration to regulate any utilities and specified a number of ordinances which the Common Council had passed which the courts had declared to be out of order. He called attention to the Milburn contract regarding street car fare made in Buffalo in 1892 and charged that the legislature at Albany had been the first to break contract conditions, which had lead investors to place their money in public utility corporations. In closing Mr. Killeen seriously questioned the sincerity of the legislators who were advocating the present public utility measures.

Municipal Ownership Measure Iniquitors

T. Harvey Ferris, Utica, former State Senator, brought out the fact that the pending legislation is a departure from the avowed purpose of the Democratic state platform, in so far as public utilities of state wide service are concerned.

William P. Gannon, representing the New York State Railways, dwelt upon the injustice of a 5-cent fare bill. He said a committee of nine disinterested Syracuse citizens had agreed that a 5-cent fare in Syracuse was confiscatory. With the privilege of city regulation optional, the city could refuse to regulate, then if the state regulated a utility in a manner considered unsatisfactory to the people, the Common Council by resolution could take over the regulation and compel the utility to yield up the rights granted by the decision of the commission.

Judge Daniel Kenefick, representing the gas and electrical interests of Buffalo, was the star speaker for the opposition. The judge attacked the municipal ownership bill as being especially vicious, in that it allowed the city to engage in every public utility. He urged if the measure was to be passed that it contain a provision that a municipality in order to engage in the business of a utility corporation should either obtain a certificate of convenience and necessity from the state regulatory body, the public service commission, or else it should be made mandatory that the city should purchase the existing utility instead of engaging in ruinous competition with it. He insisted that the bill should be amended so as to compel a referendum to the people before any regulatory body could commit the citizenry of a community to any expenditure for municipalization of a utility.

Henry R. Hayes, representing the Investment Bankers' Association of America, spoke of the danger of diversion of capital from public utility investments if the proposed measures prevail.

Warnick Kernan, attorney of Utica, representing the New York State Railways, deplored the situation of a municipality acting as judge, jury and prosecutor against a public utility corporation.

W. P. Capes, secretary to the New York State Conference of Mayors, headed the proponents of the measures. Mr. Capes objected to the provision that the municipality should apply to the state public service commission for the right to regulate utilities, instead of having the power thrust bodily upon them. This brought forth the statement from Senator Walker that this had been done purposely, to put the responsibility for rates, fares and charges where it belonged. The Senator stated that scarcely a rate, fare or charge had been increased by the Public Service Commission except on the recommendation of the local authorities to it. Senator Walker said: "They come down here under cover and ask for increased fare and then condemn the state for granting it."

The principal points brought out in the hearing were that fifty-nine local public service commissions will result in a perfect hodge-podge of regulation with no centralized body to which to refer; that the local body will act as judge, prosecutor and defender of the local service corporation; that the system will be unduly expensive; that no one really wants it; that such of it as was in the Democratic platform was written into it for Hearst to run and that the policy if pursued would mean confiscation of vested interests in general.

The proponents of the measure mustered as their principal argument that the Legislature had for years been taking away and interfering with local contracts and franchises; that the people of the cities were capable of arriving at values and regulating rates and charges to better advantage than a state body; that trolley fare, gas and electric prices and service had not been adequately policed by the state regulatory bodies, which had too often been themselves creatures of the corporations they proposed to regulate and that their system of valuations was established upon a wrongful basis.

The measures will probably be amended in the Senate, especially those which have to deal with municipal ownership and regulation of utilities in cities. The speaker of the Assembly has said that the Assembly will fight each and every measure on the program of the administration, if strict party lines be maintained in the lower house, even if the bills pass the Senate in toto. In view of this pronunciamento the fate of the measures in the Assembly appears extremely doubtful.

Seeks Injunction Against Company

A petition was filed in the Common Pleas Court by a number of residents of sections of Marietta, Ohio, where service has been discontinued, against the Monongahela-West Penn Public Service Corporation, owner of the local traction system. The petitioners seek a mandatory injunction requiring the company to operate its disused lines and give some kind of service in some degree of conformity with its still "valid and subsisting franchises." In default of this the plaintiffs ask that a mandatory injunction be issued requiring the company to remove its tracks, poles and trolley wires from the streets upon which service has been discontinued and place the streets in good repair. The petitioners further seek an injunction restraining the defendant corporation from collecting a fare in excess of 5 cents and from operating all of its lines for which it has no valid and subsisting franchise until such time as a franchise shall be obtained from the city of Marietta.

Pass Expert in Rochester

The Rochester *Times-Union*, an evening newspaper, has recently retained the services of Walter Jackson, consultant, of Mount Vernon, N. Y. As stated by that paper the purpose is "to give the people of Rochester a clearer insight into the pros and cons of the local traffic situation." Mr. Jackson's observations are appearing as a series of articles in the *Times-Union*. In his first article he gives passenger statistics and other figures to show a decline in trolley traffic. He says the present fare system is not best for the city, and that neither a street railway nor any other business concern can remain a success with a declining number of customers, even if it is making money now. The pass is talked of in interviews with Mr. Jackson published simultaneously with his articles.

In his second article Mr. Jackson compares Rochester with Cleveland and Toledo to show that the former carries the heavier burden in investment charges per car-mile. He says the Cleveland system is unable to expand because capital cannot be secured at the rate of 6 per cent permitted in the service-at-cost contract.

Mr. Jackson in his third article favors the one-man car as the most practical way to give more service at a lower cost, but condemns the one-man car used in Rochester on account of the turnstiles and slowness of operation. In an interview Mr. Jackson is quoted as saying that he proved to J. F. Hamilton, president of the Rochester lines, that the type of one-man car used in that city is impractical, and that the weekly pass is the only way that lower fares can be given without impairing the revenues. Actually Mr. Hamilton saw Mr. Jackson but a few minutes and gave no basis for this statement.

The fourth article quotes figures to show that actual operating costs are not excessive. He states that a return to the 5-cent fare would add 10 per cent more riders during the most crowded period, and would bring the earnings to an average of 40 cents per car-mile. This, he states, is too little at the present cost of conducting service in Rochester.

In his next article he continues his discussion of operating costs, showing operating revenues for the year ended July 31, 1922, as $5,093,883, or 54.01 cents per car-mile; operating expenses, including renewals and depreciation, were $3,725,625, or 39.50 cents per car-mile. Gross income available toward return on investment is given as $1,062,097. Mr. Jackson says the full 6 per cent return on the investment would be $1,156,098, so that a deficit of $94,001 remained.

Railway Moves Against Jitneys—Mayor Upheld in Emergency Measure

The International Railway, Buffalo, N. Y., has started a new move to kill off jitney competition. Since the streets have been cleared of snow and the weather has become more springlike hundreds of jitneys have started operating again over all regular car routes. The International started John Doe proceedings in the City Court to ascertain what connection, if any, there is between jitney drivers and starters, who are stationed at terminals or starting points in the downtown business district.

Chief Judge George Woltz in the City Court already has acted on affidavits submitted by Herbert G. Tulley, president of the International, setting forth that starting points and terminals have been maintained by jitneys and jitneys have been operating over lines paralleling the routes of the International on Broadway, Genesee, South Park and other lines. These routes, it is further alleged, are advertised by the starters, who are claimed by the International to be in the pay of owners and drivers of jitneys to solicit passengers.

"All of these acts are in violation of the transportation law of the state," the International explains, inasmuch as no consents or certificates of convenience and necessity have been obtained by the jitney drivers from the Public Service Commission. Arrests of jitney drivers again are being made by special agents of the International and city police.

Mayor Frank X Schwab and the City Council of Buffalo were supported by the New York State Court of Appeals in their action to provide transportation facilities in Buffalo during the strike of platform employees which started on June 1, 1922. A decision handed down by the court dismisses the appeal taken by the International Railway in the matter of the application of the company for a writ of mandamus against Mayor Schwab. The decision of the court sustains the findings of the Appellate Division, Fourth Department, which reversed the order of Supreme Court Justice Pooley, and approves the stand taken by Mayor Schwab that the court had no power to compel him to remove jitneys from Buffalo's streets.

The decision of the Court of Appeals establishes the right of the Mayor to issue permits to jitneys if a similar emergency should arise again. Mr. Justice Krause upheld the Mayor's jitney action only in so far as it was taken to provide emergency transportation while the railway lines were paralyzed by the strike.

News Notes

Bill Enables Railway to Buy Bus Projects.—Assemblyman Barkman of Morris has introduced a bill in the New Jersey Legislature providing for the entrance of railway companies into the jitney and bus business.

Election Will Decide Transportation Issue.—The City Council of Jacksonville, Fla., recently passed an ordinance providing for a bond election to be held on April 10 to decide on the establishment of a bus line or an electric railway line for the southside. The approximate cost of the bus line will be $30,000 and the car line not more than $100,000.

Franchise Rights Threatened.—City Commissioners of Portland, Ore., are threatening the Oregon Electric Railway with loss of its franchise on the Macadam Road if it does not improve paving adjacent to its tracks. Repeated demands on the part of the Public Works Department that the work be done have been met with request for delay, Commissioner A. L. Barbur reports.

Strike Not Discussed at Meeting.—The annual meeting of the stockholders of the Steubenville, East Liverpool & Beaver Valley Traction Company, East Liverpool, Ohio, was held recently at Midland, Pa. All officers and directors were re-elected. It is said that the strike of the employees was not discussed and that there were no new developments in the strike situation. As related previously in the ELECTRIC RAILWAY JOURNAL the men on one of the divisions have been out for months and service suspended.

People Will Give Opinion.—Questionnaires will be submitted to the taxpayers of Brunswick, Ga., soliciting their views on the subject of the city's taking over the Brunswick & Interurban Railway. Last December the management of the railway indicated that abandonment of railway service would be inevitable unless the City Commissioners took over the property and operated it. The commissioners replying to the petition stated that the city of Brunswick could not under its present charter undertake municipal ownership of any public utility unless there were certain charter amendments passed by the Legislature. It is understood that this measure will be introduced at the next meeting of the General Assembly.

Financial and Corporate

Slight Increase in Net

Duluth Company Does Better—Interesting Review of Rate Case Before State Commission

The gross revenues of the Duluth-Superior Traction Company, Duluth, Minn., for the year 1922 show a decrease of $18,819, or 1.04 per cent, compared with the year 1921. The net income transferred to profit and loss for the year shows a net increase of $63,515. The decrease in operating expenses is attributed by A. M. Robertson, president, to most rigid economy and operation of cars in the city of Duluth under a standard of service fixed by resolution of the City Council.

In addition to $113,333 expended for renewals and charged against depreciation reserve, a sum of $173,463 was expended during the year for additions to the property. An unusually large amount of track construction and reconstruction was undertaken and completed during the year. The management believes that any deferred maintenance caused by the war and labor shortage during the past year is fully provided for in the accounts. Five dividends of $1 per share for each of the quarters ended June 30, 1921, Sept. 30, 1921, Dec. 31, 1921, March 31, 1922, and June 30, 1922, were paid upon the 4 per cent cumulative preferred stock, but no dividends were declared or paid on the common capital stock.

Mr. Robertson has reviewed for the benefit of the stockholders the history of the case before the Railroad & Warehouse Commission affecting fares in Duluth. It will be recalled that under date of July 13, the commission filed its order and decision fixing the value of the company's property in Duluth as of Dec. 31, 1921, at $4,599,978, allowing an annual rate of return of 7½ per cent on this value and fixing the rate of fare at 6 cents cash, with five tickets or tokens, each good for one ride, to be sold for 25 cents. Convinced that the order and decision of the commission would not yield a reasonable return upon the fair value of the property, an action was immediately brought in the United States District Court by the railway to enjoin the enforcement of the commission's order. The company alleged confiscation of its property.

INCOME STATEMENT OF THE DULUTH SUPERIOR TRACTION COMPANY

	1922	1921
Total railway operating revenues	$1,759,046	$1,777,330
Total railway operating expenses	1,405,366	1,493,305
Net revenue railway operation	$353,680	$284,026
Taxes assignable to railway operation	113,273	107,410
Operating income	$240,408	$176,615
Total non-operating income	26,973	27,509
Gross income	$267,381	$204,125
Interest on funded debt and miscellaneous debits	175,278	175,537
Net income transferred to profit and loss	$92,103	$28,587
General mortgage sinking fund payment	$20,615	$27,296

A temporary injunction, effective Aug. 1, 1922, was granted by the court restraining the commission and the city of Duluth from interfering with the company collecting a 6-cent cash fare until the case could be heard on its merits in the United States court. Later upon application of the city the injunction was amended so as to require the company to sell five tickets for 30 cents with a coupon attached redeemable by the company for 5 cents, if on final decree the court should sustain the commission's order requiring the sale of five tickets or tokens for 25 cents.

The city has appealed to the United States Supreme Court from the order of the lower court granting this temporary injunction as amended. This appeal is now pending. The management believes its right to collect at least a 6-cent fare will be sustained by the court in its final decree.

Mr. Robertson expressed his appreciation of the voluntary action of the Duluth Chamber of Commerce in appointing in November, 1922, a special committee with instructions to negotiate with the City Council and the company for the settlement by compromise of all litigation now pending between the company and the city and for an agreement upon certain extensions of lines to be made in 1923.

Under date of Oct. 23, 1922, application was filed by the company with the Railroad Commission of Wisconsin for a revaluation of the company's properties in the city of Superior and a readjustment of the rate of fare there. A hearing on this application was held in the city of Superior. Evidence on behalf of the company was introduced and the hearing continued to Feb. 6, 1923, in Madison, Wis.

Maturities Total $22,928,500

Electric railway maturities for April 1923 total $22,928,500. Among these are the Tri-City Railway & Light Company, $6,696,000 5 per cent bonds, the Detroit United Railway $4,500,000 7 per cent bonds and the $4,500,000 of the St. Louis & Suburban Railway general 5s.

New Officers Named

The new officers of the Menominee & Marinette Light & Traction Company, Menominee, Mich., are as follows: President, Clement C. Smith; vice-presidents, J. P. Pulliam, C. R. Phenicie; secretary, Howard Greene; treasurer, H. C. Mackay; general manager, A. J. Goedjen, and superintendent, James I. Searles.

Toledo Surplus $126,106

Operating Results for 1922 Under Service-at-Cost Grant Show Satisfactory Improvement

The result of operation of the Community Traction Company at Toledo, Ohio, during the fiscal year 1922 was a surplus of $126,106. This sum was credited to the fare stabilizing fund, according to the report made to the City Council by Wilfred E. Cann, Street Railway Commissioner.

The gain of $126,106 in the stabilizing fund compares with a deficit of $325,035 for the preceding eleven months under the Milner service-at-cost ordinance.

Marked improvement in general industrial and business conditions at Toledo, regulation of bus competition and economies in operation are largely responsible for the change.

The improvement in business conditions is shown by the fact that in December, 1922, the average number of revenue passengers a day was 176,614, an increase of 27,956 passengers per day over the low period of August, 1921. Railway travel in December, 1922, was, however, still 16,000 passengers a day less than in February, 1921, the first month of operations under the new ordinance.

During the year $212,500 was credited to the sinking fund. This sum was used in purchasing bonds of the company for retirement. At retirement of the bonds a corresponding par value of common stock is issued the city upon which the regular 6 per cent rate is earned for the benefit of the fund. At the end of the year the city had purchased $255,000 of the bonds and an additional $109,000 had been ordered delivered on Feb. 1, 1923. There remained in the fund then a cash balance of more than $36,000, to which $17,708 is added each month out of operating revenues. The city is now earning $1,820 a month on its present holdings of $364,000 of common stock in the company.

The municipal purchase feature of the Toledo ordinance, while it is admirably thought out as a purchase proposition, has placed a burden on the car rider. The commissioner has shown in his report that each passenger paying full fare contributed 0.44 cents to the sinking fund every time he paid fare. Had there been no sinking fund provision the $407,291 which has been contributed to the sinking fund by car riders would have insured a reduction to a 6¼-cent fare last September and would have held out hope of another drop in fare this year.

Actual running speeds have been increased by abolition of skip-stops and no alteration in schedules. Increased industrial prosperity has, however, brought more and longer freight trains to contend with at the many grade crossings in the city.

For maintenance of tracks, cars and trolley $497,835 was spent during the year. This is at the rate of 6.526 cents per car-mile. During 1923 it is proposed to spend $640,000 on maintenance.

This will increase the rate per car-mile for this item about 1.4 cents.

Revenue per car-mile increased 3.038 cents in 1922. This was due in some measure to the higher rate of fare. The expense of operation and maintenance decreased 3.232 cents per car-mile. Savings came from lower rate for power, lower maintenance expenditures and minor operating economies.

The commissioner reported that he still "believes that one-man cars can be operated on certain lines" so as to permit of improvement in service and savings to the end that lower fares may be attained. Studies he has made tend to discourage any attempt to put the weekly pass into effect in Toledo. He recommends the double-tracking of single-track lines and grade crossing elimination. Mr. Cann said:

The Community Traction Company is being operated on a sound business basis, is meeting all of its obligations and each month is decreasing the deficit incurred in the early months of operation.

With the whole-hearted support of every one the Toledo railway can attain the high place in public opinion reached by the Cleveland and Rochester railways under the same form of operation.

The statement printed below shows the income and expenses for 1922 compared with results obtained in 1921.

Railway Securities at Auction

Electric railway securities sold at auction by A. H. Muller & Sons, New York, on March 21 were as follows:

$4,000 Manhattan Railway 4 per cent consolidated bonds, due 1990, interest April and October, 61⅜ per cent.

$2,000 New York Westchester & Boston Railway first mortgage 4½ per cent bonds, due 1946, interest January and July, 44⅜ per cent.

$2,000 St. Paul City Railway Cable consld. 5 per cent bonds, due 1937, interest January and July, 93½ per cent.

$3,000 Western New York & Pennsylvania Railway general mortgage 4 per cent bonds, due 1943, interest April and October, 75⅛ per cent.

Consolidation of El Paso Companies Proposed

The management of the El Paso (Tex.) Electric Railway has asked permission of the City Council to merge the three Stone & Webster companies which are now operating in El Paso into one general utility concern.

Under the proposed plan the El Paso & Juarez Traction Company and the Rio Grande Traction Company will be merged with the El Paso Electric Railway. The authority to combine the three companies is sought to enable the company to obtain funds on better terms for needed improvements.

The El Paso & Juarez Traction Company is capitalized for $146,000 and operates the railway and power plant in Juarez. The Rio Grande Valley Traction Company operates the interurban lines between El Paso and Ysleta. It is capitalized for $500,000.

STATEMENT OF INCOME AND EXPENSES OF THE COMMUNITY TRACTION COMPANY, TOLEDO, OHIO

INCOME AND EXPENSE

	1922		1921		Per Cent of Revenue 1922	Per Cent of Revenue 1921	Cents per Car-Mile 1922	Cents per Car-Mile 1921
Passenger revenue								
Cash fares	$2,224,284		$2,040,301		60.857	64.79		
Token fares	1,069,254		821,117		29.255	26.08		
Transfers and children	117,447		99,548		3.213	3.16		
Total passenger revenue		$3,410,986		$2,960,966	93.325	94.03	44.716	42.198
Other revenue								
Special cars	1,655		1,272		.04	.04		
Station and car privileges	19,848		18,440		.54	.58		
Rent of track and terminals	184,097		149,615		5.04	4.75		
Rent of equipment	17,418		14,753		.48	.47		
Miscellaneous	20,959		3,843		.57	.13		
Total other revenue		243,977		187,923	6.68	5.97	3.198	2.678
Gross income from all sources		$3,654,963		$3,148,889	100.00	100.00	47.914	44.876
Operating expense								
Car operation								
Motormen and conductors	930,403		946,799		25.46	30.07		
Carhouse employees	101,918		98,096		2.79	3.11		
Superintendence cars	102,243		100,307		2.80	3.18		
Balance car operation	133,173		112,422		3.64	3.57		
Total car operation		$1,267,737		1,257,624	34.68	39.93	16.619	17.923
Power								
For cars	441,450		456,727					
Other purposes	58,012		48,396					
Total power		$499,462		505,123	13.66	16.04	6.548	7.198
General expense								
Commissioner's office	25,059		22,762		.68	.72		
General salaries and law	53,176		48,902		1.45	1.55		
Insurance	12,242		18,475		.34	.59		
Injury and damages	116,553		79,905		3.19	2.54		
Rent buildings and property	29,193		21,323		.80	.68		
General and stores expense	59,606		67,754		1.63	2.15		
Total general expense		295,829		259,122	8.09	8.23	3.878	3.693
Total operating expense		$2,063,029		$2,021,869	56.44	64.21	27.045	28.814
Maintenance and repairs								
Ways and structures								
Roadway and tracks	129,319		167,395					
Paving	51,864		65,128					
Buildings and structures	7,887		7,093					
Superintendence ways and structures	32,939		32,597					
Miscellaneous	3,726		4,645					
Totals ways and structures	225,735		276,858		6.18	8.79	2.959	3.945
Equipment								
Car maintenance	183,465		195,609					
Other equipment maintenance	26,332		17,330					
Superintendence maintenance equipment	26,705		34,895					
Total equipment maintenance	236,502			247,834	6.47	7.87	3.100	3.532
Trolley maintenance	35,597		35,935		.97	1.41	.467	.512
Total maintenance and repairs		497,835		560,629	13.62	17.80	6.526	7.989
Total operation and maintenance		$2,560,865		$2,582,498	70.06	82.01	33.571	36.803
Depreciation	42,500		109,794		1.16	3.48	.557	1.565
Sinking fund	212,500		194,791		5.81	6.20	2.786	2.776
Taxes	191,116		110,094		5.23	3.49	2.505	1.569
Interest floating debt	1,876		82		.05		.025	
Bond interest and dividends	520,000		476,666		14.23	15 14	6.817	6.794
		967,992		891,427	26.48	28.31	12.690	12.704
Total deductions from income		$3,528,857		$3,473,925	96.54	110.32	46.261	49.508
Stabilizing fund		126,106		*325,035	3.45	*10.32	1.653	*4 632
Interest earned on fund		3,637						
Net addition to stabilizing fund		$129,743		*$325,035				

Note—Figures for 1921 are for eleven months only. * Deficit.

$4,107,514 Strike Cost in Buffalo in Six Months

Thomas E. Mitten, chairman of the executive committee of the International Railway, Buffalo, N. Y., and head of Mitten Management, Inc., which operates the local and interurban lines of the company, has sent out a statement to stockholders of the company in which he says that while the market value of the company's securities has been adversely affected by the strike, "the inherent value of the property is today actually greater, in spite of the millions lost in revenue, than it was before the strike, and certain it is, looking ahead through a course of years, that the permanent financial success of the International Railway could never be assured until labor had undertaken, as it now has, to co-operate with management and recognize an obligation to the public and to the capital invested in the property."

The letter says the company's income account for the twelve months ended June 30, 1922, shows net income of $284,893. The strike loss, he says, was $4,107,514 for the six months to Dec. 31, 1922. The statement says:

The outcome of the strike was a complete victory for the company. Jitney competition is being eliminated and earnings are now approaching normal. While the contest was long and costly, Mitten Management realized when undertaking the responsibility for the management of the property, following the default of the old International Traction bonds, that it would probably be necessary to go through this experience before permanent peace and the best operation of the property could be accomplished.

The reorganization committee, at the conclusion of its work in 1920, set aside in the hands of trustees for the International Railway a special fund available for use in financing a strike, it being clearly recognized that the bankruptcy of 1918 would surely be re-enacted in a few years if the company did not shake off the uneconomic operating conditions resulting from union domination. This special fund was used to provide cash necessary to carry on operation during the strike period.

The Mitten co-operative plan, under which the employees have a free and independent vote for representatives for proper collective bargaining, is now in full force and effect. Experienced management and effective men will, now that the road has been cleared, co-operate for the same satisfactory solution in Buffalo as they have already accomplished in Philadelphia, and will effectively carry out the contract of accomplishment entered into with Mitten Management:

1. To render adequate service to the public.
2. To promote, among the employees, efficiency and co-operation, essential to successful operation and a betterment of their own conditions.
3. To protect the owners' investment in the property and to assure the earning and payment of a reasonable return.

Dividends to Be Paid in Louisville

A dividend of 2½ per cent will be paid on April 1 to stockholders of the Louisville (Ky.) Railway on an issue of $3,500,000 cumulative preferred stock to stockholders of record March 15. This announcement was made recently, following a conference of the company's directors.

It was stated by President Barnes at the annual meeting of the stockholders that arrangements were being made to resume paying dividends. Mention was made of this in the ELECTRIC RAILWAY JOURNAL, issue of March 3.

The dividend is the first authorized by the company on any of its stock since 1918. In October, 1918, a dividend of 1¼ per cent was paid on preferred stock, while in July of the same year a common stock dividend was paid.

The preferred stock of the company carries a 5 per cent rate, and when the dividend just authorized is paid, the accumulated unpaid arrears will be reduced to 20 per cent.

New Company Will Operate Branch

George Bayly, vice-president of the First National Bank of Lima, has been made president of the new Lima & Defiance Railway. This branch of the Indiana, Columbus & Eastern has been bought by patrons along the line, to insure continued car service. Directors of the company, besides Mr. Bayly, are E. A. Evans, Lima; Joseph A. Murray, Kalida; D. F. Operlander, president of the Defiance Chamber of Commerce, and A. D. Bowen, Elyria, inventor of the type of gasoline cars which will be used on the line. C. S. Carl, for fifteen years auditor of the Ohio Electric Company, will serve in that capacity with the new company. Cars will be operated at two-hour intervals and a plan has been worked out whereby the company will use motor trucks for the assembly and distribution of freight hauled by gasoline cars.

Changes Suggested in P. S. Stock Structure

The board of directors of Public Service Corporation of New Jersey has called special stockholders' meeting for April 2, to authorize an increase in capitalization and substitution of non-par value common stock for present $100 par shares. The present common shares are to be exchanged for two new shares of no-par value.

The present authorized capital is $100,000,000, divided into 500,000 shares of common, 250,000 shares 8 per cent preferred, and 250,000 shares of 7 per cent preferred stock, all $100 par value. Plan provides for authorized new capitalization of 2,000,000 shares of no par common, and 1,000,000 shares of preferred stock, $100 par.

Of the 1,000,000 preferred shares to be authorized, 250,000 shares will remain 8 per cent, 500,000 shares will be 7 per cent and 250,000 shares 6 per cent preferred stock.

T. N. McCarter, president, explaining proposed changes in a letter to stockholders, says that he believes the best interests of the stockholders will be served by having the common stock of no par value, making it more favorable for the small investor, also that increased capitalization is desirable as providing means of future financing to take care of rapid growth of operating companies.

Making Headway Under Receivership

The receivers of the Peoria Railway Terminal Company, Chicago, Ill., have made some headway in keeping the property in shape to serve the public and to pay off the creditors having priority claims. It is said the receivers hope that such claims can be disposed of during 1923.

The Peoria Railway Terminal Company passed into the hands of receivers on Aug. 3, 1922. The company was not operating at the time of the receivership, but later on, after adjusting its labor matters, it was able to resume both freight and passenger operation and has since been doing a fairly good business.

	Latest	Month Ago	Year Ago	Since War High	Since War Low
Street Railway Fares* 1913 = 4.84	Mar. 1923 **6.89**	Feb 1923 **6.94**	Mar. 1922 **7.14**	May 1921 **7.24**	Mar. 1923 **6.89**
Street Railway Materials* 1913 = 100	Feb. 1923 **174**	Jan. 1923 **175**	Feb. 1922 **156**	Sept. 1920 **247**	Sept. 1921 **156**
Street Railway Wages* 1913 = 100	Mar. 1923 **207**	Feb. 1923 **207**	Mar. 1922 **212**	Sept. 1920 **232**	Jan. 1923 **207**
Steel—Unfilled Orders (Million Tons) 1913 = 5.91	Feb. 28 1923 **7.28**	Jan. 31 1923 **6.91**	Feb. 28 1922 **4.14**	Apr. 30 1917 **12.18**	Feb. 28 1922 **4.14**
U.S. Bank Clearings Outside N. Y. City (Billions)	Feb. 1923 **13.22**	Jan. 1923 **16.56**	Feb. 1922 **10.65**	March 1920 **18.54**	Feb. 1922 **10.65**
Business Failures	Feb. 1923	Jan. 1923	Feb. 1922	Jan. 1922	Sept. 1922
Number	**1,570**	**2,155**	**2,072**	**2,722**	**1,469**
Liabilities (millions)	**36.46**	**53.43**	**66.92**	**105.7**	**31.92**

Conspectus of Indexes for March, 1923

Compiled for Publication in this Paper by

Albert S. Richey
Electric Railway Engineer
Worcester, Mass.

	Latest	Month Ago	Year Ago	Since War High	Since War Low
Eng. News-Record Construction costs 1913 = 100	Mar. 1923 **205.2**	Feb. 1923 **197.4**	Mar. 1922 **162.0**	June 1920 **273.8**	Mar. 1922 **162.0**
U.S. Bur. Lab. Stat. Wholesale Commodities 1913 = 100	Feb. 1923 **157**	Jan. 1923 **156**	Feb. 1922 **141**	May 1920 **247**	Jan. 1922 **138**
Bradstreet's Wholesale Commodities 1913=9.21	Mar. 1 1923 **13.93**	Feb. 1 1923 **13.72**	Mar. 1 1922 **11.60**	Feb. 1 1920 **20.87**	June 1 1921 **10.62**
Dun's—Wholesale Commodities 1913 = 120.9	Mar. 1 1923 **191.2**	Feb. 1 1923 **186.2**	Mar. 1 1922 **169.7**	May 1 1920 **263.3**	July 1 1921 **159.8**
U.S. Bur. Lab. Stat. Retail food 1913 = 100	Feb. 1923 **142**	Jan. 1923 **144**	Feb. 1922 **142**	June 1920 **219**	Mar. 1922 **139**
Nat. Ind. Conf. Bd. Cost of living 1914 = 100	Feb. 1923 **157.5**	Jan. 1923 **158.1**	Feb. 1922 **157.7**	July 1920 **204.5**	Aug. 1922 **154.5**

*The three index numbers marked with an asterisk are computed by Mr. Richey, as follows: Fares index is average street railway fare in all United States cities with a population of 50,000 or over except New York City, and weighted according to population.

Street Railway Materials index is relative average price of materials (including fuel) used in street railway operation and maintenance, weighted according to average use of such materials.

Wages index is relative average maximum hourly wage of motormen and conductors on 105 street and interurban railways in the United States, operating more than 100 passenger cars each, and weighted according to number of cars.

B.R.T. Reorganization Plan Formally Announced

A definite plan for the reorganization of the Brooklyn Rapid Transit Company has been evolved and approved by committees representing the several groups of security holders, it was announced on March 21. The reorganization plan paves the way for the lifting of the receivership instituted on Dec. 31, 1918.

With the plan is appended the first statement of Receiver Lindley M. Garrison, showing in detail the work accomplished under his supervision. This report indicated that the Brooklyn Rapid Transit Company, with its subsidiary surface lines, has steadily been moving toward a profitable basis and, combined with substantial reductions in operating costs, there has been a continued growth in passenger traffic with increasing gross revenues. During the receivership, it was shown, approximately $10,000,000 had been spent on new car equipment and 35 miles of new roadway had been opened, in addition to the expansion of power house facilities which, Mr. Garrison stated, are now ample to provide for all the company's lines.

Albert Wiggin acting for the committee representing the stockholders issued a statement which he concluded as follows:

> The foregoing improvement in conditions indicates that, upon completion of the reorganization, the properties will be self-supporting and their development and expansion so as to keep pace with the growth of traffic and the performance of their public functions will be reasonably safeguarded and assured. The plan is not intended to conflict with the consummation of any plans which the Transit Commission or other public authorities may have under consideration for the readjustment and development of the transit ficilities of the city. On the contrary, it is believed that the termination of the receivership and the substitution of a solvent company with which the public authorities may deal will promote and assist in the successful solution of such problems in so far as they relate to or affect the properties of the Brooklyn Rapid Transit system.

The details of the tentative terms of the reorganization were published in the ELECTRIC RAILWAY JOURNAL for Feb. 17, page 304.

Net Income Lower in February

The city of Detroit, Department of Street Railways, reports a total operating revenue of $1,619,266 for the twenty-eight days ended February, 1923, against $1,712,228 for the month preceding. Of the total operating revenue $1,528,539 was realized in February from transportation. In January this figure was $1,620,210. Operating expenses show a decrease amounting to $1,185,779 in February and $1,221,492 in January. The net revenue shows a falling off from January. In that month the net revenue from railway operations was $490,736 and in February it was $433,487. The net income in February was $40,834, against $70,558 in January. The total number of passengers carried in February was 37,707,665, against 40,167,868 in January. The three days less in the month of February as compared to January largely account for these reductions.

Abandonment Approved.—The New York Transit Commission some weeks ago approved the declaration of abandonment of four routes and franchises of the Twenty-third Street Railway.

Defeat Purchase Proposal.—The ratepayers of London, Ont., have defeated a by-law to purchase and rehabilitate the London Street Railway. The price was set at $2,600,000.

Surplus Increases.—The gross earnings of the Bangor Railway & Electric Company, Bangor, Me., for the year ended Dec. 30, 1922, were $1,488,936, against $1,420,471 for the year ended December, 1921. The surplus for 1922 was $198,552, against $152,798 in 1921.

$44,000 Note Issue Proposed.—The Madison (Wis.) Railways has received authority from the Railroad Commission to issue $44,000 of notes, $37,000 of which will be used to provide funds with which to pay for overhead equipment, ties, rails, wire, etc., following its plan to double track on East Johnson Street.

Traffic Shows Decrease.—The Savannah Electric & Power Company, Savannah, Ga., carried 14,908,278 passengers in 1922, including cash and transfer passengers. This figure represents a decrease of 7.5 per cent in comparison with the number carried during 1921. During the past year the company paid $552,000 in wages and salaries.

Officers Named.—The officers of the Five-Mile Beach Electric Railway, Wildwood, N. J., are as follows: President, R. E. Breed; vice-president, George N. Tidd; secretary and treasurer, Frank B. Ball; purchasing agent, F. B. Kiel, and master mechanic, M. T. Griffin. Mr. Breed and some of the other officials of the company are associated with the American Gas & Electric Company, which now controls the Five-Mile Beach property.

Loss in 1922 Amounted to $2,933.—Monterey & Pacific Grove Railway, operating in Monterey and Pacific Grove, Calif., reports to the commission for the year 1922 that its operating revenue was $25,712 and operating expenses $26,399, giving a net operating loss of $687. Interest, rent, taxes and other deductions totaled $2,246. The net corporate loss for the year was $2,933. The deficit at the beginning of the year amounted to $7,629 and miscellaneous deductions were $2,642, leaving an accumulated deficit at the end of the year of $13,204.

Stock Issue Approved.—The application of the Cumberland County Traction Company to issue capital stock in the amount of $135 000 has been approved by the New Jersey Board of Public Utility Commissioners. The company asked for permission for an issue of $50,200 cumulative 7 per cent preferred stock, and also an issue of $59,000 common stock to be used for the acquisition of certain property formerly owned by the Bridgeton & Millville Traction Company. The Cumberland company also asked permission to make an additional $25,000 issue of stock to provide funds for improvements.

Gold Bonds on Sale.—Bodell & Company, Providence, R. I., are offering at 100 and interest, yielding 7 per cent, $2,500,000 of thirty-year convertible debenture gold bonds. series A, of the Federal Light & Traction Company, New York, N. Y. The bonds are dated March 1, 1923, and are due March 1, 1953. The proceeds from the sale of these bonds will be used in large part to retire bonds and ten-year notes of the company maturing in July and December, 1923.

Traffic Increases in February.—During February the total number of passengers carried by the Public Service Railway was 30,205,821, or 272,584 more than the number carried in February, 1922. During the month of January last the company carried 33,992,663. The number of passengers paying the base fare of 8 cents last month was 10,426,648, as compared with 11,133,840 during February, 1922, and 11,905,283 during last January. The company sold last month 12,977,824 tokens at the rate of four for 30 cents. This compares with 12,201,298 sold during February, 1922, and 14,453,000 during January of this year. These statistics are shown in the monthly statement filed with the United States District Court at Trenton.

Seeks Bond Payment Extension.—The Denver (Colo.) Tramway has informed the holders of the first mortgage improvement 5 per cent gold bonds of the Denver Tramway Power Company, which it owns, that it wishes to extend the payment on these bonds. The bonds are due April 1, 1923, but the tramway offers to extend $788,000 face value of the bonds, being all now outstanding and unpaid, for a period of one year so that they will mature on April 1, 1924. The notice states that under existing conditions, with the company in receivership, it is unable to finance the payment of the bonds at the present time, either by the sale of its first and refunding sinking fund mortgage 5 per cent bonds, which are reserved to refund this issue, or by the sale of other securities.

Bonds Will Be Redeemed.—All of the outstanding first mortgage 5 per cent gold bonds of the Kokomo, Marion & Western Traction Company, amounting to $622,000, due July 1, 1933, will, it is announced, be redeemed on July 1 at 105 and interest. The Kokomo, Marion & Western Traction Company was included by consolidation in the system of the Indiana Railways & Light Company. The bonds are secured by a first closed mortgage on the property of the former Kokomo, Marion & Western Traction Company, including the power station at Kokomo, 9 miles of city railway in Kokomo, the electric lighting plants at Kokomo, Swayzee and Greentown and 28 miles of interurban railway between Kokomo and Marion. The bonds underlie $1,254,000 of the Indiana Railways & Light Company first refunding 5s of 1943, the indenture for which contained a provision for the retirement on the Kokomo, Marion & Western Traction Company bonds.

Traffic and Transportation

Matter of Warrants Up Again

Five-Cent Fare Complicates Difficulties in Seattle—One Solution Calls for Longer Period to Pay for Lines

The 5-cent fare now being charged on the Seattle (Wash.) Municipal Railway has further complicated the railway situation. This is indicated by the announcement by the Seattle Clearing House Association that the Municipal Railway warrants covering wages to trainmen and purchases of supplies will not be cashed by the local banks. The warrants are due March 27, and will exceed $225,000. J. A. Swalwell, vice-president of the association, stated that the street car system would be so imbedded in debt by the end of the year that the banks would be called upon to carry more than $1,000,000 in warrants, which they did not believe would be good business.

An increase of 3 per cent has been noted in the patronage since restoration of the 5-cent fare, but a 45 per cent increase is necessary in order to break even. Receipts for eleven days in March average $12,380 a day. This amount is slightly less than sufficient to pay actual operating and maintenance expenses, which total $12,500 a day. The next semi-annual interest payment on the $15,000,000 purchase price is due to be set aside Aug. 1, for payment one month later. Bond redemption amounts to $843,000 annually.

Operating under a fare of 8⅓ cents during the year 1922, the railway system fell short $132,916 of taking care of all expenses and bond redemption requirements, according to the annual report recently made public. The report shows also a net profit of $710,084, gross revenue $6,216,569 and gross operating expenses $4,631,508. The net profit shown on the books of the department takes no account of the annual bond redemption of $843,000.

City Council members are making various suggestions for solving the railway problem. There is some sentiment in favor of forcing a rewriting of the Stone & Webster purchase contract, permitting a longer period to pay for the lines and reducing the purchase price. There is a general feeling against charging the general fund of the city with any of the railway expenses. This is impossible under recent court rulings, unless the matter is placed on the city ballot and receives the sanction of the voters.

Springfield Starts Weekly Pass to Show Missouri

Shortly after Albert E. Reynolds became vice-president and general manager of the Springfield (Mo.) Traction Company he made an analysis of the riding in that city and concluded that the unlimited-ride, transferable weekly pass offered the best opportunity to build up riding and revenue during the off-peak hours. His idea was heartily indorsed by E. N. Sanderson, president of the Federal Light & Traction Company, who had become intimately acquainted with pass possibilities through his observations of pass riding at St. John, N. B. Following a conference with Walter Jackson, consultant to the Springfield company, Mr. Reynolds made application to the Missouri Public Service Commission, which gave its consent unanimously for the first installation in the State.

The fares in Springfield have been 7 cents cash and four tickets for 25 cents on the cars with free transfers to the company's cars and buses. The fares on the buses are 5 cents straight and 2 cents for a transfer to either car or bus. The pass will be sold at $1, No. 1 going into effect on Monday morning, March 26. Vice-president Reynolds has arranged for daily articles, advertisements and talks during the week preceding the installation.

Mayor's Promise Can't Be Fulfilled

Chairman McAneny of the New York Transit Commission has pointed out that nothing could be clearer than the fact that there will be no funds whatever available for subways under the Mayor's program unless the city's needs for schools, docks and other necessaries are set aside or starved down, and that if they were there would hardly be enough available to make more than a feeble start upon subway building.

Mr. McAneny says that these facts are pointed out not with any controversial intent but because the people should have the truth, so they may understand that the promises of the Mayor are impossible of fulfillment.

City Comptroller Craig had reported that the total unreserved borrowing margin within the debt limit available for specific authorization for any municipal purpose on Dec. 31 last was $128,514,871. He has previously estimated that the additional borrowing capacity accruing the present year will be about $44,000,000.

Mr. McAneny says that the first outstanding fact is that against the total of these two figures there must be charged before anything else the following commitments of the city, to which the comptroller also makes reference, and for which the Board of Estimate is bound to make provision:

School sites, ferryboats and other specific items	$15,640,000
Staten Island freight and passenger tunnel	61,000,000
Additional school requirements	64,205,000
Unfinished construction on the dual subway system	35,600,000
Total	$176,445,000

Mr. McAneny says:

> The Comptroller, in the absence of definite information, as he put it, did not include in his figures the remaining cost of the dual subway work. The figures given here, which are official, are those of the commission's engineers. It would appear that these four items alone not only offset the city's entire borrowing capacity of Dec. 31, but all that will be added to it for a year ahead.

Detroit Comptroller Advocates Six-Cent Fare

Henry J. Steffens, City Comptroller of Detroit, has incurred the displeasure of Senator James Couzens, former Detroit Mayor. Mr. Steffens, it seems, has been growing uneasy over the outlook for the operation of the municipal railway. In consequence he suggested —mind you, not advocated—merely suggested a 6-cent fare as a means of meeting the cost of street railway extensions.

Mr. Steffens denied wanting to get into a wrangle with Mr. Couzens or any one else over the question of whether one-third of the people now have to pay 6 cents—a 5-cent fare and 1 cent for a transfer—to get downtown. He was, however, apparently willing to go the limit in defence of his own suggestion, for he was quoted by the Free Press:

> I handle the finances of the street railway department and know that the road is making money and is paying for itself. I also know that this road, or any other, cannot make extensions to the sum of $4,000,000 a year on a 5-cent fare.
>
> Every man familiar with the growth of Detroit knows that extensions must be made to the present street railway system. It is just a question of whether these extensions are to be made with money raised by bond issue, or by increased revenue derived from the increase in fare. This question must be determined, and I believe that the mayoralty candidates could thresh it out. That was my reason for suggesting it.
>
> I realize that a 6-cent fare is rather hard to make the people like. It is a difficult thing to place before the people, and that seems to be the reason that it is considered bad politics to discuss it. But the facts will come out, and sometime we will realize that possibly it is just as well to increase the fare and make the lines pay for necessary extensions, rather than issue more bonds for that purpose.

Auto Buses Presented to Board of Education

The Board of Education of Baltimore furnishes transportation to and from public schools to crippled children, but as the board owns no vehicles to give this service except police patrol wagons, the children have had to travel in wagons of this kind.

This defect in the plan was recently brought to the attention of the United Railways & Electric Company, Baltimore, and H. B. Flowers, general manager of the company, wrote to the president of the board saying that that company would be very glad to present to the board two buses which had been withdrawn from service.

The new offer was gratefully accepted by the board. The two buses were then sent to the paint shop of the company and painted to the order of the board, and have just been put in service. Several letters have been received by C. D. Emmons, president of the company, from the teachers and children expressing their appreciation of the generosity of the company.

Conferences Held on Transportation Problem

The Los Angeles Board of Public Utilities has held a series of conferences on the subject of transportation. At the meetings bus service proposals and the increase of present electric railway facilities received special consideration. The Los Angeles Railway has submitted a proposal for the operation of three bus lines. G. J. Kuhrts, general manager, said with reference to the subject of buses that if the people of Los Angeles desired bus transportation in addition to railway service and were willing to pay the rates his company would even go so far as to parallel its own lines. He first suggested that the matter receive careful study and that a service such as has been suggested be tried out first in connection with a few of his company's lines.

Advocates Extension for Five-Cent Fare Benefit

Extension of the Mount Baker Street line of the Municipal Railway into the Rainier Valley district to compete with the privately owned Seattle & Rainier Valley Railway has been advocated by Mayor E. J. Brown of Seattle as an attempt to give residents of that district improved service and to supply them with a 5-cent fare, as compared with the 8½-cent rate which the private line has continued charging. By authority of a new law passed by the recent Legislature, residents of any community may form a local improvement district for the purpose of extending the municipal railway. Assessment for the improvement would be made and spread out over the district according to the benefits derived, the same as for other forms of improvements, such as sewers, paving and grading.

Weekly Pass Discontinued in Youngstown

The weekly pass will be discontinued in Youngstown, Ohio, after April 1. The City Council has adopted legislation which has been approved by Mayor Reese providing for a readjustment of the rates of fare and of the street railway service of the Youngstown Municipal Railway.

The new rate of fare, which is adopted for a trial period and becomes effective April 2, provides for 7 cents cash, three tickets for 20 cents, and 1 cent for a transfer. The rate which has been in effect is 9 cents cash, six tickets for 50 cents, 1 cent for a transfer and an unlimited ride weekly pass for $1.25.

Legislation adopted at the same time upon recommendation of Street Railway Commissioner Harry Engle provides for curtailment of the all-night "owl" service, the rearrangement of service on one line to make a material reduction in the car-miles being operated and the suspension of service on two short lines where service heretofore has been given on a half-hour basis.

The suspension of service on the two short lines became effective March 18, coincident with the starting by the railway company of two new motor bus lines which traverse the more important parts of the railway lines on which service has been suspended and are operated at closer headways, effecting an improvement in the service to these sections.

The two new bus lines, making four such lines operated by the company, serve the southern section of the city, and, in addition to serving the sections in which railway service is suspended, open up large sections of the city not heretofore directly served by the company. With this new service the Youngstown Municipal Railway is operating sixteen buses on four lines.

Plans to Start Bus Operation.—The British Columbia Electric Railway, Vancouver, B. C., is planning to start the operation of buses in the Grandview district of the city by April 1. This is in accordance with a recent agreement between the company and the city.

Returns to Higher Fare.—The Calgary (Alta.) Street Railway has returned to the old rate of fare, namely, four tickets for 25 cents. The 5-cent fare was given a two months tryout and failed to increase the patronage. The railway system is owned by the city.

Will Operate Third Bus Line.—A subsidiary of the Johnstown (Pa.) Traction Company, known as the Traction Bus Company, will operate a third bus line in Johnstown. The railway now operates four buses as "feeders" traversing the Dale district and Lorain Borough.

Threatens Abandonment. — The Lehigh Valley Transit Company recently announced to the Common Council of Quakertown, Pa., that the line between Quakertown and Richlandtown was producing no revenue and might be abandoned. The trolley road was laid in Quakertown twenty-five years ago.

Overnight Express Service Started.—Overnight electric express service between Reading and Philadelphia was started recently by the Reading Transit & Light Company. It has proved popular with shippers along the company's lines chiefly because it saves a whole business day in the delivery of shipments.

Buses Running in Schenectady. — Seven new bus routes are being operated in Schenectady, N. Y., following the Council's recent vote in favor of bus lines running in competition with the Schenectady Railway during the emergency period. The Council at the same time gave its unanimous approval to the return of the 5-cent fare on the trolley lines.

Fare Increased.—By agreement between the Dallas (Tex.) Railway and the city authorities of Highland Park, a suburb of Dallas, fares between Dallas and Highland Park and the Southern Methodist University, in the latter city, have been increased to 8 cents. Heretofore the fare has been 6 cents. Under the terms of the agreement the railway will do some construction work.

One-Man Cars to Be Used. — One-man cars will be installed on the St. Joseph (Mo.) Railway, Light, Heat & Power Company's system during the present year, according to a recent announcement of B. C. Adams, general manager. The change in operation is being made to cut down the railway's losses. Last year in the railway department there was a loss of $36,000. This year, Mr. Adams said, the company would probably break even with the one-man cars in operation.

Seek Old Jitney Regulations.—Petitions bearing the signatures of 3,000 residents and railway patrons of Houston, Tex., have been presented to the City Council asking that the old regulations governing the operation of jitneys in the city be restored. These regulations permitted the operation of 250 buses under city supervision at a fare of 5 cents. On application of the Houston Electric Company this number was cut to 150 and restricted to eleven lines about a year ago as a compromise between the city and the company.

Bus Permit Granted.—The City Council of Wheeling, W. Va., has granted the Bus Transportation Company the one permit issued for the operation of bus lines in the east and north ends of the city. This company is owned by the controlling stockholders of the City Railway. The Bus Transportation Company won the permit over the Ultimate Bus Company and the National Transportation Company on the contention that it proposed to give work to the employees who would lose their positions as a result of the abandonment of the North Wheeling division and the East End loop of the City Railway.

Health Service Requirement.—Attention of the members of the Central Electric Railway Association is being called to the fact that the Bureau of Public Health Service of the United States, Treasury Department, requires that water used by common carriers for drinking and culinary purposes on cars shall be cooled in such a manner that the ice cannot come in contact with the water. The bureau requests that the regulations be strictly enforced in the case of new equipment placed in use by common carriers. In regard to present equipment this requirement will be strictly enforced after July 1, 1924.

Authorizes Filing Reduced Fare Tariffs.—The Pacific Northwest Traction Company, Bellingham, Wash., has received authority from the Department of Public Works to file on less than statutory notice a tariff making approximately 20 per cent reduction in round trip fares between Seattle and Bellingham. The reduction does not apply between Seattle and Everett. Between Seattle and Bellingham, the reduction will be from the present fare of $5.80 to $4.65. The Seattle-Mount Vernon reduction is from $4.10 to $3.30, and the Seattle-Stanwood reduction from $3.30 to $2.80. The Everett-Bellingham fare is cut from $4.40 to $3.25.

Personal Items

Mr. Flowers in New Orleans

Vice-President and General Manager of Baltimore Heads Reorganized Company in Crescent City

Herbert Baker Flowers has resigned as vice-president and general manager of the United Railways & Electric Company, Baltimore, Md., to become president of the New Orleans Public Service Company, the successor under reorganization to the New Orleans Railway & Light Company. The announcement was made by C. D. Emmons, president of the company at Baltimore. For the present Mr. Flowers' duties will be performed by the assistant general managers.

Mr. Flowers became general manager of the United in 1919, when he was promoted from assistant general manager to succeed James R. Pratt, who was made vice-president and placed at the head of the claims department, Mr. Pratt later leaving the company to go into business for himself.



H. B. Flowers ©Bachrach

In Baltimore Ten Years

Graduating from the law school of the University of Michigan in 1903 and from the engineering school of that university in 1905, Mr. Flowers went into the operating department of the Detroit United Railway, taking a position in the office of Sir Albert Stanley, the general superintendent, now head of the London Underground Railways.

About ten years ago Mr. Flowers went to Baltimore to take a position with the United as assistant superintendent of transportation. In 1917 he became assistant general manager.

On Jan. 21 last, W. Frank Roberts, president of the Baltimore Alliance of Charitable Agencies, appointed Mr. Flowers to direct the 1923 financial campaign of the Alliance. Since that time he had been working with the directors of the charitable organization in perfecting plans for the campaign.

Mr. Flowers is representative of the American Electric Railway Association on the sectional committee of the American Engineering Standards Committee appointed to formulate a uniform code of colors for traffic signals. He was chairman of the committee on traffic regulations of the American Electric Railway Traffic & Transportation Association from 1919 to 1922, and is now chairman of the special committee on trackless transportation. He was a member of the one-man car committee in 1921.

The Baltimore *News* said editorially of the appointment of Mr. Flowers:

> Herbert Baker Flowers made so excellent a record as vice-president and general manager of the United Railways of Baltimore that it is not surprising that he was called to the presidency of the New Orleans company. At the same time it is much to be regretted that Baltimore is to lose him. It was inevitable that a man of his ability and experience would be in demand, but it would have been more satisfactory if the higher place had been found in Baltimore. When a city gets hold of a Herbert Baker Flowers it wants to keep him.
>
> Mr. Flowers represents the effective type of the modern executive. Trained both in law and engineering and experienced in the practical schools, he brought to his task not only efficiency, but vision. His ten years in Baltimore were useful and productive. He contributed much to the development and improvement of the street railways. He found time for community work, as, for instance, his appointment to direct the financial campaign of the Baltimore Alliance of Charitable Agencies. He had many friends. Baltimore is sorry to lose Mr. Flowers and it congratulates New Orleans.

Halcott J. Shumaker, assistant superintendent of time tables of the Philadelphia (Pa.) Rapid Transit Company, has been appointed superintendent of time tables, and George A. Dash, senior timetable maker of the Philadelphia Rapid Transit Company, has been appointed assistant superintendent of time tables. Mr. Dash has been with the company since 1903, when he entered the train service as a conductor on Feb. 11.

Thomas D. Kiniry has been appointed general superintendent of transportation of the local and interurban lines of the International Railway, Buffalo, N. Y., to succeed William M. Casey, who has accepted a similar position with the Georgia Railway & Power Company, Atlanta, Ga. Mr. Kiniry comes to Buffalo from the Philadelphia (Pa.) Rapid Transit Company, where he had been superintendent of supervision since April 1, 1922.

J. Rowland Bibbins, recently manager Department of Transportation, United States Chamber of Commerce, and previously supervising engineer of the Arnold Company of Chicago, has opened an office as consulting engineer at 921 Fifteenth Street, Washington, D. C. Mr. Bibbins will make a specialty of transportation developments and is prepared to make complete surveys and economic studies of city transit systems, roads and port terminals or motor transport undertakings, and to conduct valuation investigations. Mr. Bibbins has had an extended experience in all of these lines in many cities of the country.

C. V. Wood, Jr., at Providence

Springfield Official Appointed Assistant to R. R. Anderson, Superintendent of Transportation

Clark Vernon Wood, Jr., on March 15 assumed the duties of assistant to R. R. Anderson, superintendent of transportation of the United Electric Railways, Providence, R. I. Mr. Wood had been for several years in charge of the power-saving departments of the Worcester (Mass.) Consolidated and the Springfield (Mass.) Street Railways, which work he organized and successfully developed. On leaving Worcester Mr. Wood was entertained at luncheon by heads of departments of the Worcester Street Railway, on behalf of whom Henry C. Page general manager presented to him a traveling bag.

Mr. Wood is the son of Clark V. Wood, president of the Worcester and the Springfield companies. He was born in Beaver, a suburb of Pittsburgh, Pa., March 22, 1899. For several years the family lived in Canton, Ohio, and Boston, Mass., during which time Mr. Wood attended the public schools. Some time after removing to Springfield he entered Worcester Academy, but left in the middle of his course for the purpose of engaging in war work. A slight disability barred him from admission to the Navy and he took up wireless telegraphy. He began his electric railway work with the freight department of the Connecticut Company in Hartford. Later he became assistant to W. L. Harwood, engineer of power and equipment of the Springfield Street Railway. In this work his duties related to car shops, tools, inspection, etc. From this he went to the head of the power-saving department, which work he continued up to the time he was asked to assume the Providence post.



C. V. Wood, Jr.

B. D. Smith, who until Feb. 1 was with the engineering department of the Westinghouse Electric & Manufacturing Company, has accepted the position of eastern manager for the Sterling Varnish Company and after April 1 will take up his duties at the company's eastern office, Arlington, N. J.

C. H. Quereau, superintendent of electrical equipment of the New York Central Railroad, New York, N. Y., retired from the company on Feb. 1 on a pension because of failing health. Mr. Quereau was born in East Greenwich, Conn., on May 30, 1856, and was graduated from the Northwestern University at Evanston, Ill. He entered steam railroad work almost immediately becoming connected with the Chicago, Burlington & Quincy Railroad, Aurora, Ill., from 1888 to 1894 as chemist and engineer of tests. He served with the same company from 1894 to 1897 as assistant superintendent of motive power for the lines west of the Missouri River. He then left the service of the Chicago, Burlington & Quincy and went into the employ of the Denver & Rio Grande as master mechanic and assistant superintendent of motive power at Denver, Col. He resigned this job to return East and from November, 1902, to 1905 was superintendent of shops of the New York Central Railroad at West Albany. From 1905 to the present time Mr. Quereau has been superintendent of electrical equipment in charge of the lines operated out of the Grand Central Terminal, New York. His successor with the New York Central Railroad has not yet been appointed.

Obituary

W. W. Gurley

William Wirt Gurley, one of the most prominent members of the Chicago bar, died suddenly at his home March 11. He had been identified with Chicago transportation for more than a quarter century. His services as an expert in corporation law were of the utmost value to the original South Side Elevated Company and later to the Metropolitan Elevated, but his reputation largely rests upon his activities as counsel for the receiver of the Union Traction Company in 1906. Subsequently with the formation of the Chicago Railways he became its general counsel and in 1914, upon the passage of the unification ordinance, providing for the unified operation of all surface companies under the designation of the Chicago Surface Lines, he was named as its general counsel.

Mr. Gurley was recognized in the legal profession as the only man who was familiar with all of the intricate phases of the reorganization plan which resulted in the acquisition of the Union Traction properties by the Chicago Railways and with the ordinances under which present corporations are operating. In addition to his activities in traction matters he was general counsel for a number of other important companies.

Mr. Gurley was born in Mount Gilead, Ohio, in 1851 and was graduated from Ohio Wesleyan University in 1870, and for two years was superintendent of public schools at Seville, Ohio. He went to Chicago in 1874. He is survived by his wife and one daughter.

Andrew Sylvester Littlefield

Andrew Sylvester Littlefield, for many years Western agent of the Lorain Steel Company, died suddenly at his residence in Chicago on March 4, 1923. His death was due to heart trouble, which had developed very recently.

Mr. Littlefield was born on Oct. 4, 1859, in Baltimore, Md. He went to Chicago in 1886 with O. W. Meysenburg, with whom he was associated until 1898. In addition to being representative of the Lorain Steel Company he was active in the construction of cable, elevated and electric railways in Chicago and throughout the Central West. Mr. Littlefield became identified with the American Railway Construction Company and was instrumental in the early construction of the surface lines of North and West Chicago. He later became president of the North American Railway Construction Company, which office, in addition to the Lorain Steel Company work, he retained until his death.



A. S. Littlefield

Mr. Littlefield undertook and completed the deck and track work of the Northwestern Elevated, the third tracking of the South Side Elevated and the extension of the Englewood Branch. During his residence in Chicago the company with which he was connected constructed more than 150 miles of surface lines in that city. He was at one time vice-president of the Lake Street Elevated, now part of the Chicago Elevated System.

Mr. Littlefield was a member of the Union League Club, Chicago Athletic Club, South Shore Country Club, Exmoor Country Club and Lake Shore Athletic Club of Chicago. He was also a member of the Art Club of Philadelphia and Chicago Chamber of Commerce. He is survived by four sons, Arthur S. Littlefield, Raymond S. Littlefield, Calvin Goodrich Littlefield and Worthington Littlefield.

Services were held at his late residence on March 7 and interment was in the family mausoleum, Rosehill Cemetery.

Among the electric railway men who acted as honorary pallbearers were B. J. Arnold, C. V. Weston, Harvey B. Fleming, J. V. Sullivan, J. Z. Murphy and B. J. Fallon.

Fred H. Goff

Fred H. Goff, a Cleveland banker, died on March 15, at the age of sixty-four. He was well known to the electric railway industry because of the conspicuous part he played in the settlement of Cleveland's ten-year railway war.

For the last fifteen years Mr. Goff had been president of the Cleveland Trust Company. He represented the Cleveland Railway in 1907 as an arbitrator in fixing the valuation under the present service-at-cost franchise. The late Tom L. Johnson, then Mayor, was the arbitrator representing the city.

As a result of that arbitration, conducted under the supervision of the late Federal Judge Tayler, after whom the Cleveland operating grant is named, there was a 45 per cent reduction in the value of the Cleveland Railway property as claimed by the company, but a settlement was effected.

Ever since the conclusion of his work in connection with the settlement of the railway dispute Mr. Goff had been a conspicuous figure in the civic life of the city. He was a tireless worker and ready at all times to act in the rôle of peacemaker in controversies affecting the public interest. Because he had the confidence of the people his services were of extremely high value.

Mr. Goff started out in life as a lawyer, but entered the banking field in 1908 as president of the Cleveland Trust Company, building up that institution's deposits from $25,000,000 to $167,000,000, its depositors from 72,000 to 396,000, its number of offices from ten to fifty-two and its total assets from $30,000,000 to $180,000,000. Moreover, at no time, not even during the war, were loans made by the Cleveland Trust Company at a rate of interest to exceed 6 per cent.

In 1914 Mr. Goff gained nation-wide distinction by founding what is known as the Cleveland Foundation, a community trust fund to which wealthy Clevelanders leave part of their estates, the income from which is devoted to serving Cleveland's community needs. Foundations patterned after Mr. Goff's ideas have since been established in many other cities.

In 1921 Mr. Goff was designated by President Harding to act as an official mediator in promoting a settlement of then outstanding railroad claims against the Government, as a result of Federal control of the railroads during the war.

Besides being head of the Cleveland Trust Company at the time of his death, Mr. Goff was also an active director in a large number of railroad and industrial enterprises. He was vice-president of the Cleveland Terminal Valley Railroad, chairman of the board of the Chicago, Lake Shore & South Bend Railroad, a director of the Baltimore & Ohio Railroad and vice-president of the Cleveland, Lorain & Wheeling Railroad.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

Referendum on Trade Association Activities

Trade associations are the subject of a referendum submitted by the Chamber of Commerce of the United States to its membership. The activities of trade associations have been carefully gone into by a special committee of which Philip H. Gadsden, formerly president of the American Electric Railway Association, is a member. This committee has now presented a report containing recommendations. The report and its recommendations are the basis for the propositions submitted to a referendum vote.

It is pointed out in the committee's report that "there is a long list of functions which trade associations perform in the interest of their members and of the community at large. These functions are illustrated by the standardizing and safeguarding of the quality of goods, the reducing of waste in manufacture and distribution, the promotion of trade, both domestic and foreign, and the upbuilding in scores of other ways of industry and commerce."

Rules Formulated

In considering statistical activities of trade associations and the value of statistics to business enterprise and the public, the committee has formulated several rules which it submits as recommendations:

Reports of members to their association should be accurate and sufficiently complete to prevent misconstruction.

As distributed to the membership, the statistics should not be accompanied with any interpretation or other comment which could induce or facilitate concerted action on the part of members.

All statistics regarding prices should be confined to closed transactions, and should not refer to pending transactions or future transactions.

The committee says that it is no part of the function of a trade association to attempt to obtain concerted action by advising members how to conduct their own businesses. Price statistics for closed transactions show facts; the function of collecting and distributing these is consequently reportorial. As to the contention in some quarters that summaries, average prices on typical lines or figures grouped together according to territorial districts are sufficient, the committee believes that for the use of the members of most trade associations more detailed information is necessary and can see no objection to the distribution of such information to the members and to the public.

The committee recommends that every trade association that collects statistics should, immediately upon issuing the statistics to the membership, furnish them to the public press and to the Department of Commerce, the Federal Trade Commission, the Department of Justice and such other government agencies as may have use for them.

Summarizing the preceding discussion, the committee believes that trustworthy information concerning capacity, production, stocks, sales and prices is essential to the effective operation of industry and trade under competitive conditions. The voluntary reporting of such information to trade associations and the subsequent publication or dissemination of such information in a manner which makes it available not only to contributors but also to consumers and to the public generally are beneficial alike to the field of business and the public and do not constitute a restraint of trade.

Latest Railway Directory Has New Features

The February edition of the McGraw Electric Railway Directory, recently off the press, contains, in addition to the usual data as to number of cars owned, miles of track, gage, powerhouse and substation details, and various other data included for some time past, the further new data covering the number of miles of track in paved streets as distinguished from open tracks, the rate of fare prevailing on each property as the directory went to press, the number of one-man cars operated, and the number of motor buses owned by each railway company. The additional data amplify the usefulness of the directory. It now contains practically all of the common data needed about any company in addition to an authentic and up-to-date listing of all officials and department heads.

Comments on Business in Steam Turbines

E. H. Sniffin, manager power sales department of the Westinghouse Electric & Manufacturing Company, recently commented on the large amount of business in steam turbine-generators. This company has received during the last few months orders aggregating nearly 600,000 kw. Mr. Sniffin stated that the amount of such business this year could only be limited by the manufacturing capacity. Sections of the Westinghouse plant in which these machines are built have been working at full capacity since last summer. According to Mr. Sniffin, previous to that time there was a dearth of new business covering a period of eighteen months. It follows then, in the opinion of the power sales manager, that steam turbines are purchased when the money market is easy and finances can be obtained to build new plants and add new equipment to existing stations.

Auction of Car Plant Set for April 2

Though the Barney & Smith Car Company's plant, which at one time was valued at more than $3,250,000, could have been purchased for approximately $666,000, two-thirds of the latest appraisment, there were no bidders on March 15, when Sheriff Howard Webster of Montgomery County offered the works for sale at Dayton for the fourth time. Another postponement resulted, with April 2 set for the next auction. The plant was offered on foreclosure proceedings brought by the bondholders, who hold a $2,000,000 mortgage.

Authorizations and Proposals for Reconstruction

The Bradford Town Council has been authorized to borrow £63,000 for forty-six new cars, and £104,925 for track reconstruction. The Yarmouth Town Council has adopted proposals for a scheme of permanent way reconstruction to cost £55,000. The Newcastle-on-Tyne Town Council proposes to apply for permission to borrow £179,000 for extensions and renewals of tramways.

After years of talk and negotiations the proposed Dearne Valley light electric railway is going to be constructed. A tender has just been accepted for the construction of the line, about 15 miles long, starting from Barnsley and connecting a number of small towns and villages. The cost is to be £200,000. The rolling stock and electric plant will be provided by the English Electric Company at a price of £37,000. Over the greater part of its length the railway will be laid on existing highways. The scheme is a joint one in the hands of a number of local authorities concerned.

Council Approves Car Leasing Plan

Final approval of the plan to lease 100 new cars, with option to purchase after a period of years, has been voted unanimously by the City Council of Seattle, Wash. The board of public works will immediately proceed to call for bids from manufacturers willing to furnish cars under the plan proposed.

Metal, Coal and Material Prices

Metals—New York	March 20, 1923
Copper, electrolytic, cents per lb	17.25
Copper wire base, cents per lb	19.375
Lead, cents per lb	8.25
Zinc, cents per lb	8.175
Tin, Straits, cents per lb	49.25
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	7.125
Somerset mine run, Boston, net tons	3.375
Pittsburgh mine run, Pittsburgh, net tons	2.375
Franklin, Ill., screenings, Chicago, net tons	2.375
Central, Ill., screenings, Chicago, net tons	1.625
Kansas screenings, Kansas City, net tons	2.625
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft	7.50
Weatherproof wire base, N. Y., cents per lb.	19.50
Cement, Chicago net prices, without bags	$2.20
Linseed oil (5-bbl. lots), N. Y., per gal	$1.01
White lead, (100-lb. keg), N.Y., cents per lb	13.375
Turpentine, (bbl. lots), N.Y., per gal	$1.53

Rolling Stock

Connecticut Company, New Haven, Conn., is said to be considering the purchase of fifty new cars.

Lewiston & Reedsville Electric Railway, Lewiston, Pa., a Day & Zimmermann property, is planning the purchase of four cars, but no decision has been made about the equipment.

Citizens' Traction Company, Oil City, Pa., has not yet placed the order for the six new cars which it contemplates purchasing. It is likely the order will be placed shortly.

Grand Rapids (Mich.) Railway proposes to remodel this year twenty-eight cars to a more modern type of rolling equipment. These will be fitted with standard safety devices for operation as one-man cars. It is also proposed to purchase eight new cars of this type.

Birmingham Railway, Light & Power Company, Birmingham, Ala., will, according to J. S. Pevear, president and co-receiver, have to purchase from fifty-five to sixty new cars of the larger type, if the ordinance is enforced requiring separate cars for white and negro passengers.

Houston (Tex.) Electric Company has made application to the City Council to purchase ten new double-truck Birney safety cars. The order for these cars will be placed as soon as the City Council approves the application. The company is now operating ten cars of the same type which were purchased in 1922.

Eastern Massachusetts Street Railway, Boston, Mass., has placed an order with the J. G. Brill Company of Philadelphia for fifty new double-truck cars of the one-man type at a cost of $580,000. Deliveries will be made in October and November and the cars will be distributed among several of the fifteen operating districts.

St. Joseph (Mo.) Railway, Light, Heat & Power Company, to meet its new program providing for one-man car installation is having built twelve new cars by the American Car Company, St. Louis, and four old cars are being remodeled to meet the requirements of the company. The new cars that are being built in St. Louis will cost about $70,000, according to General Manager Adams, and the company is financing the purchase of them through the sale of trust certificates on the St. Joseph market. Arrangements for their sale have just been completed. The new surface cars will seat about thirty-five passengers.

Track and Roadway

Dallas (Tex.) Railway will rebuild certain portions of its tracks in Highland Park and do some street paving.

Nashville Railway & Light Company, Nashville, Tenn., through a Senate resolution, has been requested to extend the Jefferson Street line to the State Agriculture and Normal School for negroes.

Los Angeles (Calif.) Railway has laid a single track in the Third Street extension being made from Third and Larchmont along Larchmont to La Brea. The work has been carried to Mulford.

Tuscaloosa (Ala.) Railway & Utilities Company has been reconstructing its loop line and the suburban line to Holt. The company has already received 3,000 new ties. About $15,000 will be spent on these improvements.

Buffalo & Lake Erie Traction Company, Erie, Pa., will likely construct a double-track line with connecting curves in Twenty-first Street from State to Peach Streets. An ordinance to this effect is to be introduced in the City Council.

New York, N. Y.—The Board of Estimate having failed to act upon the bid of the Phoenix Bridge Company for the construction of part of the Flushing extension of the Queensboro subway and the bid having been withdrawn, as permitted by law, the Transit Commission has readvertised the contract and will receive new bids on April 2.

Indiana Service Corporation, Fort Wayne, Ind., is planning extensive improvements to the city lines of Fort Wayne, during the present year. These improvements include the double-tracking of the South Calhoun Street line, the double-tracking and extension of the Pontiac Street line and the establishment of a new car line on Lafayette Street. Petitions have already been placed with the Board of Public Works asking authority to start this work. The Lafayette and Pontiac projects were taken under advisement by the board, but the resolution for the South Calhoun Street improvement was immediately adopted.

Power Houses, Shops and Buildings

Bangor Railway & Electric Company, Bangor, Me., has purchased a four-story brick building in Bangor to be used as a waiting room.

Chicago (Ill.) Surface Lines will move its offices from the Borland Building to the new Illinois-Merchants Building, Clark and Jackson Streets, on May 1.

Connecticut Company, New Haven, Conn., has awarded a contract to the Sperry Engineering Company, New Haven, to enlarge the power plant of the company on Grand Avenue, New Haven. The addition will be of brick and steel, one story high, 36 x 72 ft., and will cost $25,000. New equipment will also be added.

Los Angeles (Calif.) Railway will build a fifth automatic power substation. The order for a 1,000-kw. converter has been placed with the General Electric Company. Plans and specifications are being prepared for the building, which will measure 40 x 46 ft. The southwest section of the city will be served by this new station.

Trade Notes

Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., has appointed G. B. Kirker manager of the railway division of its Los Angeles office and has changed the name of that division to transportation division.

Walter A. Zelnicker Supply Company, St. Louis, Mo., moved its offices on March 1 from 325 Locust Street to the Chamber of Commerce Building, 511 Locust Street. The company's plant and yards in East St. Louis now cover fourteen acres.

Metal & Thermit Corporation, New York, N. Y., will move its Pittsburgh branch on May 1 from 801-807 Hillsboro Street, Corliss Station, to 1514 Fayette Street, N. S. In order to take care of the increasing business in the Pittsburgh territory a modern welding shop is now being constructed.

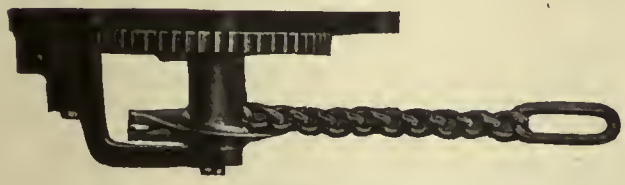
Russell Company, Kenosha, Wis., has received a contract from the Oneida Motor Truck Company for the building of gas-propelled railroad coaches. The Oneida works have started production on six trains for the Russell Company which have already been sold to several Eastern steam railroad lines. The engines for these coaches are 6-cylinder, 70-hp. Wisconsins.

Cleveland (Ohio) Fare Box Company—Canadian Cleveland Fare Box Company, Ltd., Preston, Ont., announce their appointment as manufacturer's distributors to electric railways for the C. L. Downey Company, Cincinnati. The products of this company embrace hand and motor driven coin counting machines, coin sorting machines, coin wrappers, coin trays and manual coin counters. The coin counting machines will handle all sizes of tokens and coins of all denominations up to and including the 50-cent piece. It will also handle foreign coins of all sizes up to and including the dimensions of the United States 50-cent piece.

Haskelite Manufacturing Corporation, Chicago, Ill., recently received orders for forty-five Haskelite roofs for the Type 4,200 trailers, which will be built in the shops of the Detroit Municipal Railway. Among other recent installations of Haskelite roofs are the forty-five used by the Chicago Surface Lines, in construction of their model light-weight safety cars. A similar car, equipped with center-door entrance, was built for the Municipal Railway of San Francisco. Twenty of these cars, constructed at the American car shops, were fitted with Haskelite roofs as well as twenty additional cars built at the Bethlehem shipbuilding plant. The company has also received an order for Haskelite head linings for fifty-five Pittsburgh cars to be reconstructed at the St. Louis Car Company plant. Haskelite head linings were specified by the Pittsburgh Railway for these. Similar cars recently built by Pressed Steel Car Company were also fitted with Haskelite linings. These items show growing interest in this material.

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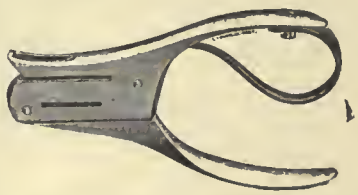
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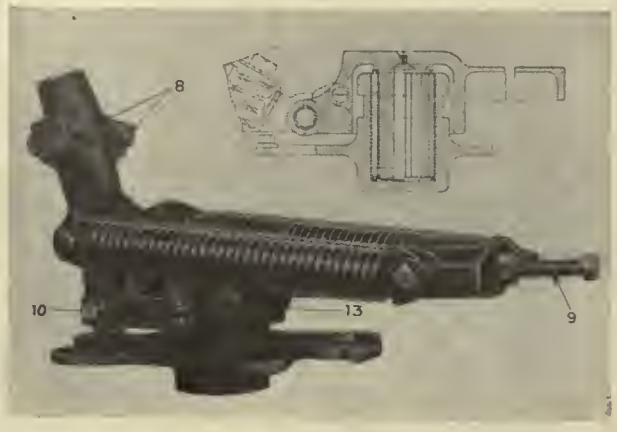
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Details of Philadelphia Order for 576 Cars

On Jan. 22 the board of directors of the Philadelphia Rapid Transit Company authorized the lease and purchase by car trust agreement of 576 new cars of which 520 will be passenger cars. A brief note in regard to the order, which is said to be the largest single order for trolley cars ever placed in this country, was made in the issue of the ELECTRIC RAILWAY JOURNAL for March 3. Details regarding the equipment are now available. The eighty-de-

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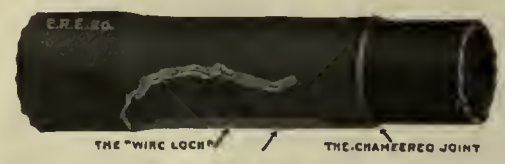
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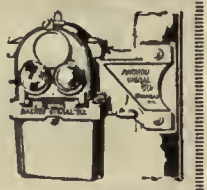
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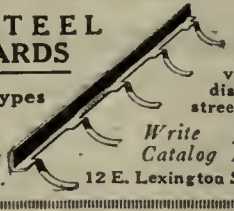
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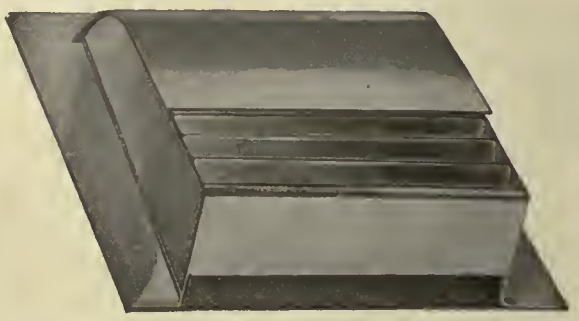
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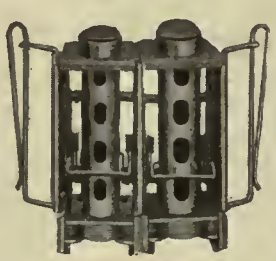
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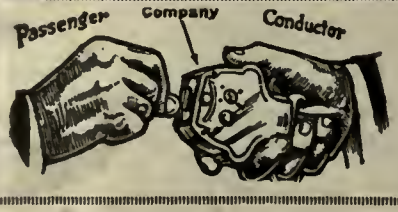
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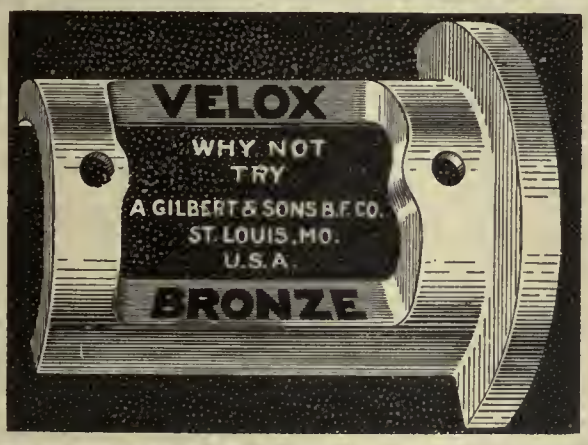
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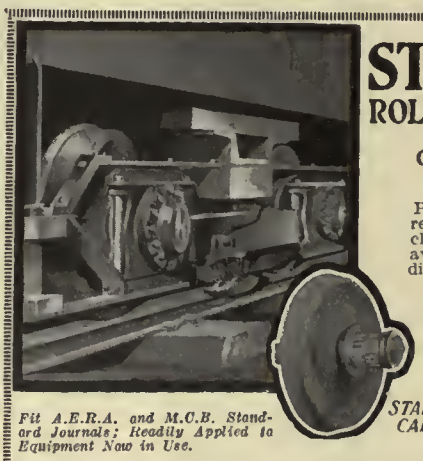
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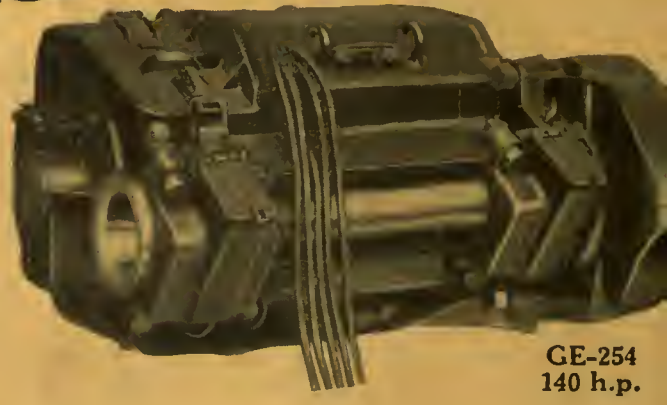
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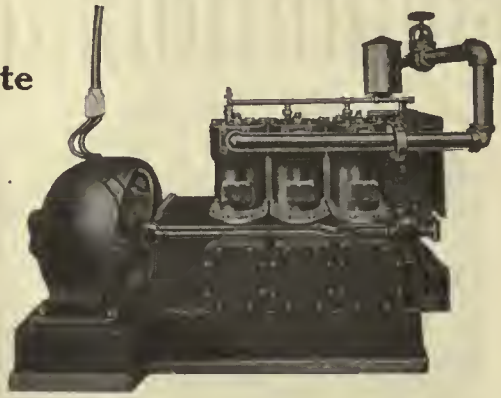
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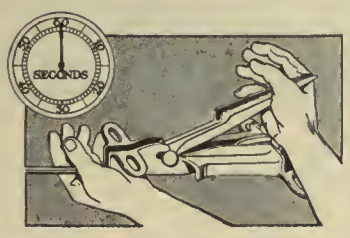


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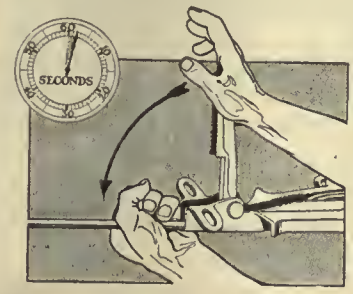


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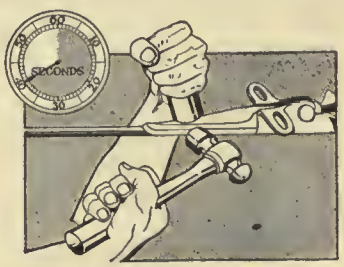
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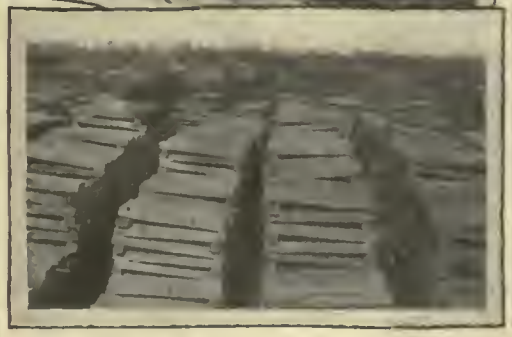
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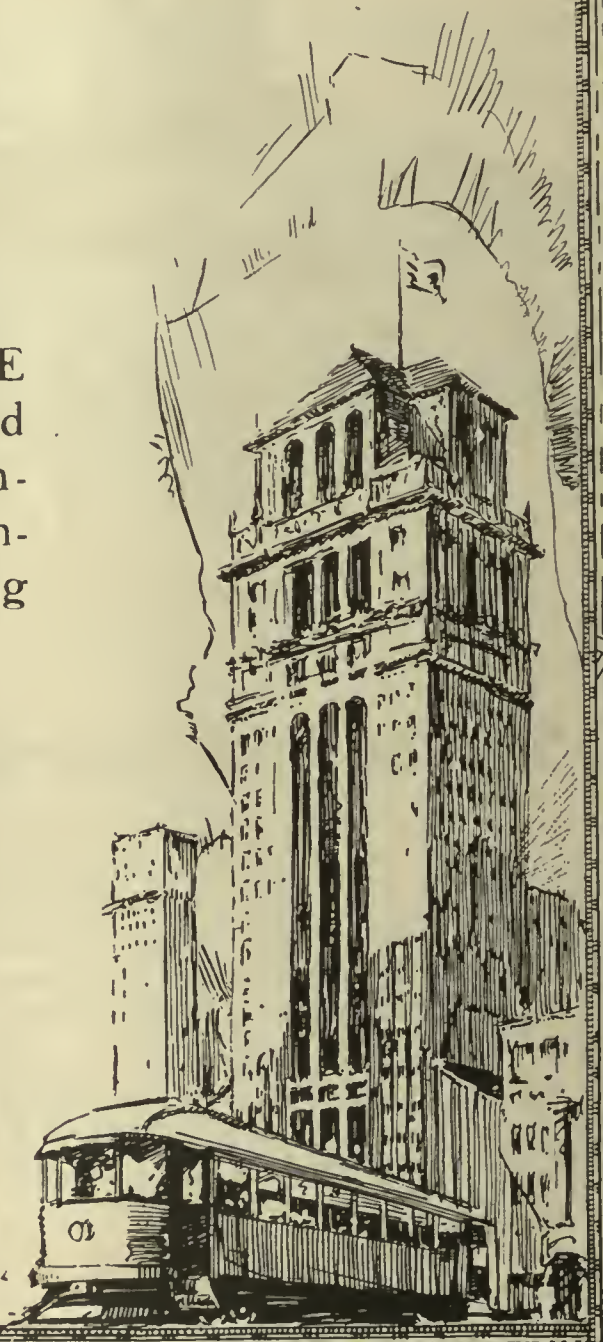
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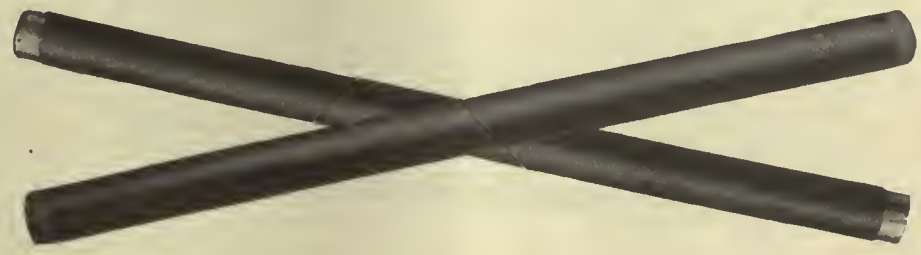


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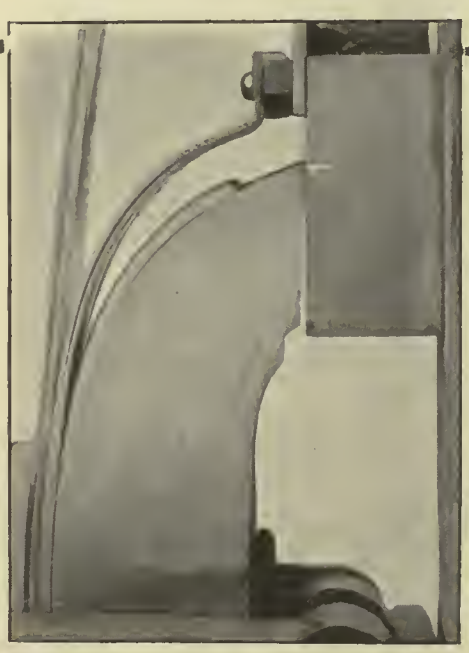
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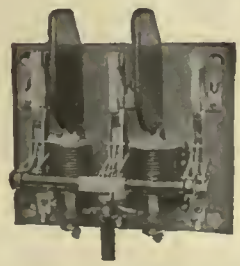
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ELECTRIC RAILWAY JOURNAL

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Company, Inc.

HENRY W. BLAKE and HARRY L. BROWN, *Editors*

Volume 61 New York, Saturday, March 31, 1923 *Number* 13

Snow Stimulates Traffic by Putting Autos in Storage

LAST winter was a record breaker for snow in New England and Central New York and most of the electric railway properties in that district show a greatly increased expense for snow removal. But for every drawback there is nearly always some compensating advantage, and in this case it lies in the fact that the snow interfered with the operation of private automobiles to a greater extent even than with the trolley cars. The result was that whenever an automobile was put up for the winter, the former users of it had to use the trolley system of transportation, and this meant an increase in revenue.

To quote the figures for one property, on the Eastern Massachusetts Street Railway the railway revenue for January and February, 1923, was 7½ per cent higher than during the corresponding months in 1922. How much of this increase was due to the temporary discontinuance of private automobiles because of the unusually severe winter and how much to other causes it is, of course, difficult to say, but the condition suggests a query as to whether, at least for some of the roads in the snow belt, the peak of the business in the future may come in the winter when the autos are largely in storage rather than in summer when they are active.

If such a condition is brought about it will mean a number of changes in operating conditions. One of these is that if there is also less of a lighting or power load on the central power station in summer than in winter the two cannot supplement each other as the peak of both will come in the winter. This, for some power installations, may mean extra equipment. Effects of equal import may occur in other departments.

"Human Talent Is the Most Precious Thing in the World"

RICHARD T. ELY has written an article for the February issue of *Administration* on "Competition in the New Era." Like all other economic subjects about which Mr. Ely has written, he has touched this one with a shaft of lightness that is most alluring. He says that the business man should seek to confer favors rather than secure them. Further, he says that the business man should turn away from the allurements of special privilege, for they are more likely to land him in the ditch than to bring him fortune. Railway men particularly will agree with him in this, having formerly operated under monopoly conditions.

On the other hand, in an open field with keen competition there are the outstanding records of such men as Wanamaker, Marshall Field, Woolworth and others. However much one may disagree with the ideas of Mr. Ford, there is no question but that in his case and in the case of others competition has brought close together merit and reward.

But the question will be asked, what has all this to do with the railway operator? A great deal. There are many cases of unfair competition between bus and railway, but there have also been some cases of unwarranted complaining. Now complaining won't get anybody very far. In the face of competitive conditions, Ford, Field, Woolworth and others didn't holler. It would have done them no good. Neither did Garrett Seely out in Youngstown, when he found that the need existed for motor bus service connecting the towns served by the railway of which he is the head. He may or may not have been conscious of the new era of competition about which Mr. Ely writes, but he did recognize a public demand and set about to satisfy it. What was the result? Just this. He has all the business on the electric railway that he had before and, in addition, as told in ELECTRIC RAILWAY JOURNAL for Jan. 27, 1923, page 169, he has created an entirely new business by supplying a public demand. Other railway managers would do well to take a leaf out of Mr. Seely's book. His case proves, as Mr. Ely has pointed out, that after all "human talent is the most precious thing in the world."

Why College Men Do Not Stay in the Transportation Department

COMMENT has been made on this page concerning the opportunity for college men in the transportation department of electric railways and the difficulty of interesting them in that phase of the business. Another and perhaps greater difficulty is to keep them satisfied once they are in that department. There are reasons for this which will bear consideration.

Under the usual conditions, a transportation man is expected to be on call twenty-four hours a day and 365 days a year. He has no time for family or play. His whereabouts at all times must be known at the office, and any personal engagement he may make is subject to the proviso "if business permits." He can call no part of his time really his own. Such a life does not appeal to the college graduate. His education has given him a wide mental horizon and a variety of interests. He appreciates the value of music, art and literature, as well as science and economics. He knows that some mental relaxation and physical exercise are essential to good work.

When the young engineer enters the transportation department he is required to give up all outside interests. If he revolts against such conditions, the old timers in the railway business mistakenly think he is lazy and contemptuously recall how hard they used to work when they were his age. It is not because he is less willing than they to work hard that the college

graduate objects to this routine, but because he has a different point of view. He knows that "perpetual devotion to what a man calls his business is only to be sustained by perpetual neglect of many other things," and he is disinclined to give up everything else. All this reference to unremitting responsibility applies as well to other men now occupying positions in the transportation department. It is as unfair to them as to the young man entering the work, but they are less free to break away from the job.

A rearrangement of duties is needed so that continuous responsibility shall not have to be borne by any one man. For example, on a large railway an operating division might perhaps be handled by two assistant superintendents, one being responsible during the day and the other during the night, with the change in shifts occurring so as to have a heavy day responsibility and a light night force, or so as to have one of the rush periods in each shift. Both assistants would report to the superintendent, but either would handle any situation, except a very great emergency, without calling on the other. In other words, each assistant superintendent and his staff would be subject to call twelve hours a day and only twelve.

On a smaller property the superintendent might take one shift himself, with his one assistant superintendent handling the other. Such an arrangement would give the supervisory transportation men some time they could really call their own. If that were done the railways would not only get better men in the transportation departments, but also better work from everybody, for there would be time to think beyond the immediate job of keeping the cars moving.

Combustion Engineering Is Making Rapid Advances These Days

THE sudden increase in the price of coal during the last few years is one of the compelling reasons for the present renaissance of boiler-plant development. Possibly another reason for this was the realization on the part of power engineers that the turbine room was outdistancing the boiler room in the race for efficiency.

Most remarkable is the way in which some responsible designing engineers have seized upon pulverized fuel burning as a remedy for some of their difficulties. It is true that as yet there are few utility power plants operating with powdered coal, but many of the plants now in contemplation or under construction will be so equipped. The reputed success of the Lakeside plant of the Milwaukee Electric Railway & Light Company, a description of which was covered in the issue of this paper for April 15, 1922, page 633, has brought countrywide attention to the subject.

One of the utilities which has been convinced is the United Electric Railways of Providence, R. I. This company has ripped out approximately 30 per cent of its present boiler capacity and is now putting in new, larger, higher pressure boilers with pulverized coal furnaces.

One factor which has been influential in this development is, of course, the possibility of using coal of poor grades in pulverized form. However, it appears that good coal can be advantageously burned in this form also. In Providence provision is being made, through arrangement of design and selection of types of equipment, to obtain a completed plant which will lend itself to investigation, on a broad scale, of different kinds of coals under regular operating conditions.

All of this does not signify that the day of the stoker is past. Far from it. Improvements in the stoker are constantly being made, and competition with this new rival will stimulate further improvements. In the meantime oil burning is on the increase, also. Boiler design is making rapid strides. Devices for the more intelligent operation of the boiler plant are constantly being developed. All of this points to the fact that combustion engineering is a vigorous art, and science as well. If the boiler room efficiencies which are now promised materialize in regular practice, the boiler will soon rank with the turbine, the electric generator and the electric transformer as an energy transforming device, if in fact it does not do so already.

Relations with Employees Should Be Based on a Spirit of Mutual Helpfulness

IT IS common to attribute to the present large size of many industrial organizations much of the lack of understanding which is often observed between employer and employee. In the day of the small undertaking, it is said, the proprietor knew every employee by name, and each of them had a greater interest and pride in the product than now, when he is engaged in a small repetitive part only in either production or merchandising. This argument against lack of co-operation loses its force, however, when one studies the work of some of the largest companies in the country which have made an effort to foster the right kind of relationship between men and management.

One of these companies is the American Bell telephone system, which, under the leadership of the late Theodore N. Vail, did pioneer work in the department of public relations. For many years its practice in this respect was far in advance of most of the other utilities of that time. Now it is doing equally important work in the department of management. In a recent statement, Vice-President Hall attributed much of the trouble with the laboring man at present to the theory that industry has become so big he has no recognized place in it except as one in a division or group, and that condition hurts his pride. Continuing, Mr. Hall said, in effect, that his company believes in making every man feel that he is an important member of the family, and that it should help each employee to get interested in his job, know what the policies of the company are, why they are adopted, and appreciate the part that he plays in the whole organization. To say that the president's door is always open for an employee is not sufficient. Means must be provided by which he can get there and back easily. This connection can well be supplied through some form of employees' organization, provided that organization is one based on the principle of co-operation and mutual confidence rather than on antagonism and mutual distrust.

The telephone company, of course, is not the only one to have progressed in this direction. The United States Steel Company has done considerable along this line, and there are of course certain railways which have accomplished much. An able plea for further progress by electric railway companies was made at the last meeting of the New England Street Railway Club by George E. Pellissier. Altogether the subject is one which could properly be considered as ranking, in importance, with public relations.



This Train Yard Has a Concrete Floor, so That the Passengers Can Board the Cars Easily at Any Point in the Yard

New Terminal in Baltimore

The Washington, Baltimore & Annapolis Electric Railroad Installs a Model Interurban Terminal for Freight and Passenger Service

ABOUT a year ago the Washington, Baltimore & Annapolis Electric Railroad completed its terminal station in Baltimore at the corner of Howard and Lombard Streets. The station is in the heart of the downtown district of the city.

The new station for both passenger and freight was planned several years ago, and the real estate has been owned for some time, but, owing to conditions brought about by the war, construction was delayed until the summer of 1921. Ground was broken on April 1, and the building was occupied for the first time on Nov. 1 of that year. The trackwork was started about June 1, 1921. Altogether, the yards and buildings occupy a total area of 78,094.40 sq.ft. divided as follows:

	Square Feet
Freight house	9,006.23
Driveway	4,320.00
Parking	853.00
Freight office	1,394.47
Freight yard, track incline	2,700.00
Terminal yard	51,389.15
Baggage room	1,196.45
Terminal station	7,234.30
Total	78,094.40

TERMINAL YARD

A feature of the terminal yard is that it is concreted throughout, as shown in the general view above, making a very clean job and one that can be flushed easily. The concrete flooring also enables passengers to board the cars easily at any point in the yard.

The passenger terminal tracks consist of four stub tracks and one loop. The trains to Washington or those on the main line of the company are dispatched from the stub tracks, while the trains to Annapolis are sent from the loop. The four stub tracks are fitted with pits for temporary repairs to cars. Altogether, the passenger tracks in the yard have a capacity for forty-eight cars. This is independent of the freight car track, which is on a slight incline, to conform with the grade on Eutaw Street.

During normal times, the company handles about 8,000 passengers per day from the terminal. This means from fifty to sixty cars per hour during the rush period. The normal week day service to Washington is about every half hour from 6 a.m. to 12 o'clock midnight, with additional local trains starting at 5 a.m. and running about every two hours, except between 5 and 8.30 p.m., when they are run more frequently. The Annapolis trains operate over the South Shore division on an hourly schedule from 6.35 a.m. to 3.35 p.m. Then they run more frequently until 7.35 p.m., when they go to a longer schedule. On the North Shore division, half-hourly service is maintained from 5.50 a.m. to 7 p.m., then hourly service until midnight, making approximately 100 trains leaving the Baltimore terminal daily. On Sundays and holidays the train service is increased to some considerable extent. The company does no local city business, and its minimum fare is 10 cents.



Above—This View of the Train Yard Is Taken from a Fourth Floor Window of the Office Building.

At Right—The Terminal of the W., B. & A. Electric Railroad in Baltimore Is in the Downtown Business Section.

Below—Plan of the Terminal Yard and Basement of the Office Building.



The overhead construction in the yard is Ohio Brass equipment with steel poles and was all installed by the railroad company. The tracks in the yard are for the most part T-rail, 7 in. high and 98 lb. per yard, with some Lorain steel 141-465 9-in. girder.

Main Terminal and Freight House

The terminal building, the main building in the group, is of reinforced concrete with Indiana limestone finish, with terrazzo or ground marble and cement floors in the waiting room and basement, and Toncan metal roofing. It has four floors besides a basement.

The basement, which is shown in plan in the drawing of the track yard, contains five banks of six toilets each, four banks being pay toilets and two free. There is also a barber shop in the basement.

The ground floor contains the waiting room, lunch room, novelty store, telephone and telegraph booths, ticket office, baggage and parcel checking room and the entrance to the train sheds. The two stores opening into the waiting room are leased. The telegraph service is somewhat unique in so far as it allows a patron to get in direct communication by telephone with the central telegraph office and give his message over the wire. He pays for it in a coin box.

The second floor contains the president's office, general manager's office, conference room, purchasing agent's office and office of the passenger agent and assistant to the president. On the third floor are the freight department for checking way bills, the general freight office, claim agent's office and also the treasurer's office. The fourth floor contains the general auditing office. Each floor has its own vault for files, records and supplies.

The team way for the freight house is on Eutaw Street and the floor follows the grade of this street, which has an incline of 2½ per cent. The freight track in the terminal yard also follows this grade. About twenty cars a day each way represent the average freight and express business done at present. The Southeastern Express Company operates over this line and handles all express business.

The architects for the terminal building, train shed and freight house were Dreher, Churchman, Paul & Ford, Philadelphia. The building contractors were the George A. Fuller Company, New York. The special trackwork was supplied by the Lorain Steel Company and was installed under the direction of E. W. Weinland, engineer maintenance-of-way of the company. J. J. Doyle is vice-president and general manager.



The Waiting Room Is Open and Attractive

City Pays Half of Deficit

THE British Columbia Electric Railway started its first bus route on March 19. It is in the city of Vancouver over a route about 2 miles in length, from the terminal of one of the car lines. One bus gives the service and there is a spare one.

One of the features of the new service is the arrangement with the city of Vancouver whereby the city pays one-half of any deficit. The company pays the other half only up to a maximum of $5,000 a year. This agreement was made last November, when the company obtained a continuance of its 6-cent fares and gave a reduction in its lighting rates. If successful, it will be the basis of other bus routes. The first week's traffic filled the bus to capacity in the rush hours. The city is owner of considerable property along the route.

Duluth Street Railway Valued

Valuation Estimates Presented by Consulting Engineers Before State Commission—Cost of Power and Bridge Contracts Included as Items of Value

ON FEB. 6 Mr. Drum of A. L. Drum & Company, Chicago, completed his testimony in the rate case of the Superior division of the Duluth Street Railway before the Railroad Commission of Wisconsin at Madison, Wis. An inventory of the property was made as of Oct. 1, 1922, and valuations of the property were prepared and submitted on four bases, namely, pre-war costs, ten-year average cost, post-war cost as of June, 1921, and estimated original cost at prices current as of date of installation. A table showing the summary of the physical property on these four bases is printed herewith, showing the percentage relationship of the latter three bases to the pre-war cost.

It is interesting to note that the valuation based on estimated original cost compares very closely with pre-war cost, being only 3.72 per cent higher than the pre-war cost, while the ten-year average cost shows an increase of 36.20 per cent, and June, 1921, prices show an increase of 76.96 per cent over pre-war costs.

In addition to the valuation of the physical property Mr. Drum submitted valuations showing the developmental cost of the property, value of a bridge contract, which permits of operation over the bridge connecting Superior, Wis., with Duluth, Minn., without additional bridge toll to the passengers of the street railway system, and value of the power contract. The value of the power contract was based on the cost to the company in obtaining this contract and perfecting a satisfactory source of power supply from the hydro-electric plant of the Great Northern Power Company. The power company paid the cost of maintaining the company's steam plant in operating condition from 1908 to 1914, while the power company was demonstrating its ability to furnish all power required, but the railway company was required to pay the insurance, taxes and interest on the plant from 1908 to 1915, when the steam plant was finally abandoned, and also suffer the loss of the investment in the plant equipment (less salvage), and these items were properly submitted as the actual cost to the street railway company in obtaining the power contract. These costs summarize as follows:

Cost of power station, land, building and equipment less salvage	$47,702.79
Interest on amount of salvage Jan. 1, 1908, to Dec. 31, 1915, at 6 per cent	5,015.76
Taxes paid on power station Jan. 1, 1908, to Dec. 31, 1915	5,551.34
Insurance paid on power station Jan. 1, 1908, to Dec. 31, 1915	2,783.59
Total cost of power contract	$61,053.48

To show that this cost in securing and perfecting the power supply was a proper expenditure on the part of the company estimates were made of the resulting saving in cost of power, as given in the table below.

	Investment on Basis of Present-Day Prices	Investment on Basis of Pre-War Prices
Total investment required for 1,500-kw. steam station and 1,500-kw. substation	$273,500	$183,600
Cost of manufacture of power, present-day prices:		
Coal	21,350	21,350
Labor	12,900	12,900
Maintenance, supplies and general	7,500	7,500
Total operating expense	41,750	41,750
Fixed charges, interest, depreciation, taxes and insurance	34,200	22,950
Total cost of power	$75,950	$64,700
Cost of power per kw.-hr., 4,000,000 kw.-hr., a.c.	$0.0190	$0.0162
Cost of power per kw.-hr., 3,720,000 kw.-hr., d.c.	0.0204	0.0174
Cost of power purchased under contract	0.0100	0.0100
Saving per kw.-hr.	$0.0104	$0.0074
Saving per year (3,720,000 kw.-hr.)	$38,688	$27,528
Present value of future saving from Oct. 1, 1922, to Nov. 17, 1931, each annual saving being discounted at 8 per cent from the end of its year to Oct. 1, 1922	$244,972	$174,307

COMPARATIVE SUMMARY OF COST OF REPRODUCING AND DEVELOPING THE PROPERTY OF THE SUPERIOR DIVISION, DULUTH STREET RAILWAY, AS OF OCT. 1, 1922, SHOWING PER CENT RELATIONSHIP OF BASES 2, 3 AND 4 TO THE PRE-WAR COST, BASIS NO. 1.

	Basis No. 1 Pre-War Cost Current Prices 1915	Basis No. 2 Ten-Year Average Cost Average Prices 1912–1921		Basis No. 3 Post-War Cost Prices Current June, 1921		Basis No. 4 Estimated Original Cost Prices Current Date of Installation	
Physical property	Amount	Amount	Per Cent of 1915	Amount	Per Cent of 1915	Amount	Per Cent of 1915
Land	$23,200	$23,200	100.00	$23,200	100.00	$23,200	100.00
Track	560,483	783,423	139.79	1,057,475	188.69	612,425	109.27
Paving	69,472	76,470	110.07	84,468	121.58	71,398	102.77
Electrical distribution system	68,137	89,441	131.27	105,578	154.95	68,137	100.00
Rolling stock	235,125	361,364	153.69	485,207	206.36	235,842	100.31
Shop machinery and tools and miscellaneous equipment	35,339	46,216	130.78	56,235	159.13	35,339	100.00
Buildings	61,329	81,823	133.41	101,627	165.71	49,853	81.29
Furniture and fixtures	7,346	11,602	157.92	16,530	225.00	6,245	85.02
Materials and supplies	38,113	38,113	100.00	38,113	100.00	38,113	100.00
Total inventoried property	$1,098,544	$1,511,652	137.60	$1,968,433	179.19	$1,140,552	103.82
Expenditures not apparent in inventory	204	204	100.00	204	100.00	204	100.00
Total	$1,098,748	$1,511,856	137.60	$1,968,637	179.19	$1,140,756	103.82
Engineering and superintendence	54,937	75,593	137.60	98,432	179.19	57,038	103.82
Total	$1,153,685	$1,587,449	137.60	$2,067,069	179.19	$1,197,794	103.82
General and miscellaneous costs							
Administration, organization and legal expense	$57,684	$79,372	137.60	$103,353	179.17	$59,890	103.83
Taxes during construction	16,842	16,532	98.16	25,630	152.18	16,842	100.00
Interest during construction	73,693	101,001	137.06	131,763	178.80	76,472	103.77
Working capital	31,074	31,074	100.00	31,074	100.00	31,074	100.00
Total general and miscellaneous costs	$179,293	$227,979	127.15	$291,820	162.76	$184,278	102.78
Cost of financing	66,649	90,772	136.19	117,944	176.97	69,103	103.68
Total cost to reproduce the physical property as of Oct. 1, 1922	$1,399,627	$1,906,200	136.20	$2,476,833	176.96	$1,451,175	103.72
Power and bridge contracts							
Cost of power contract	$61,053	$61,053	.....	$61,053	.....	$61,053	.....
Value of bridge contract	78,125	78,125	.....	78,125	.....	78,125	.....
Total power and bridge contracts	$139,178	$139,178	.....	$139,178	.....	$139,178	.....
Developmental costs							
Expenditures for obsolete equipment and construction	$376,656	$376,656	.....	$376,656	.....	$376,656	.....
Cost to unify system	22,905	22,905	.....	22,905	.....	22,905	.....
Loss of interest during operation	111,970	152,496	.....	198,147	.....	116,094	.....
Total developmental costs	$511,531	$552,057	.....	$597,708	.....	$515,655	.....
Total cost of reproducing and developing the property, including value of power and bridge contracts	$2,050,336	$2,597,435	.....	$3,213,719	.....	$2,106,008	.....

The discussion at the hearing indicated that both the commission and the company were confronted with a difficult problem in determining a reasonable rate of fare on account of the company having been unable to reach an agreement with the city of Superior with respect to the regulation of the jitney traffic and the introduction of one-man cars. The general opinion was that a joint conference between the Wisconsin commission, the city and the company should be had at which reasonable requirements as to the regulation of the jitney traffic and the use of one-man cars could be agreed upon, based on which the commission could determine a new rate of fare. During the hearing the Supreme Court of Wisconsin rendered a decision in the so-called Superior jitney case, removing the control of jitneys from the jurisdiction of the cities of Wisconsin and placing the regulation of jitneys under the Wisconsin Railroad Commission.

Visualizing Schedules

By Means of a Large Board, with Grooves to Hold Sticks Representing Various Runs, a Picture Is Obtained of the Equipment in Operation and the Possibilities for Expansion or Contraction of the Service

PROBABLY the most common method used for showing at a glance the service furnished on a particular line is by a graphic layout of the timetable. In perfecting the timetable, however, frequent changes are necessary, and with the graphic method each change usually requires the replotting of the graphs. A method of visualizing the timetable that is very flexible and which shows at a glance the cars in service, the headway, the layovers, the setbacks, the time at division points, the number of crews required and the time that they are on duty, together with the possibilities of expansion and contraction of service, to meet various traffic requirements, is illustrated herewith. The idea originated with C. E. Chalmers, receiver for the Second Avenue Railroad, New York, N. Y., and was worked out by his engineering and timetable departments.

The apparatus used includes a large board and numerous trip sticks to designate the various runs. The board is 34 in. wide and 18 ft. long. Two boards are used to give the total width and by having offsets at either end the total length is increased and the space at the offset would never be used in the various layouts. The board is ruled with lines crosswise to indicate time intervals, different colored inks being used for convenience. On the Second Avenue Railroad's board time intervals are laid off horizontally, the scale being $\frac{1}{8}$ in. for each minute or $7\frac{1}{2}$ in. to the hour. Longitudinal grooves run the full length of the board. These are made to fit the trip sticks, which are $\frac{5}{16}$ in. in diameter. There is a total of eighty-six grooves in the width of the board.

The trip sticks are of wood and their length represents a round trip, the scale for time intervals of course being the same as that for the board, $\frac{1}{8}$ in. to the minute. The trip sticks are marked to indicate division points. On the Second Avenue routes there are seven intermediate time points in addition to the ends, which of course represent the same point since the trip sticks are for round trips. These time points are marked with different colored inks. The same color is used to indicate a particular time point on all trip sticks.

Since the times of layovers at the end of runs vary somewhat, these are not included in the length of the trip sticks, but in laying out the schedule spaces are left between the different trip sticks which indicate the layovers. This method eliminates a large number of different lengths of trip sticks, which of course simplifies the laying out of the timetable.

WEEK DAY — PROPERTY OF AND TO BE RETURNED TO SECOND AVE. R. R. CO., CHARLES E. CHALMERS, Receiver.

RUN 21	TRIPS 1	2	3	4	5	6
96th N	716	848	1020	155	328	504
129th	728	900	1032	207	340	516
96th S	740	912	1044	219	352	528
59th	754	926	1058	233	406	542
34th	804	936	1108	243	416	552
10th	813	945	1117	252	426	602
34th	822	954	1126	301	436	612
59th	832	1004	1136	311	446	622
96th	846	1018	1150	325	500	636

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Trip Card Used for Schedules of the Second Avenue Railroad

Laying Out of the Timetable

With the board and trip sticks constructed the timetable may be laid out to visualize several different factors as desired. First, it may be laid out by crews. This shows both the regular and extra runs and shows how the swing runs must be laid out to take care of the extra service during peak hours and to provide for lunch periods for the various crews. In the accompanying illustration of the board the bottom part is laid out by this method. The regular runs are at the bottom and the swing runs just above these. By referring to this illustration, it will be seen that starting with the regular runs in the morning four round trips are made



Test Board Used for Checking Timetables of the Second Avenue Railroad

and then the regular crews are allowed time off for lunch. The first swing runs which occur are those for the morning rush hour. After this the swing runs fit in as the various crews leave for their lunch period. By this method each groove is taken up by a single crew. This of course shows the layovers, setbacks and headway at the various time points. The headway can be scaled directly by measuring the distance between the same colored line on the trip stick in adjacent grooves. This method of laying out a timetable is of particular advantage for showing the slack in the schedules and how this can be taken out by careful rearrangement. When this board was first used by the Second Avenue Railroad for checking its schedules it was able to take out 15 per cent of the slack, which of course reduced operating expenses considerably.

A second method of laying out the timetable is by cars in service. Public service commissions and the patrons of the railway are most interested in the service furnished, and this method of laying out the timetable indicates at a glance the number of cars that are in service, the headway, etc. With this method operation of the same car is laid out in the same horizontal groove. Layovers are indicated by the time between trip sticks, but of course the service is continuous as long as the car is operated regardless of what crew has it. On the board shown in the accompanying illustration the top of the board is laid out to show the cars in service on the Second Avenue line after 11 a.m. For convenience in checking the various information desired, a T-square is used which fits to the board, and by following along the edge of the square the number of cars in service, the number of crews and like information is shown at any time desired.

A third method of laying out the timetable is by intervals. When this method is used, the cars follow in their regular order regardless of whether they are on swing runs or regular runs.

After the final timetable had been adopted by the Second Avenue Railroad run cards were made out to show the time at the various division points. A sample of one of these cards is shown herewith. Runs on the Second Avenue line start at Ninety-sixth Street and go north to 129th Street; they then return south to Tenth Street, where again they turn north to Ninety-sixth Street, making the round trip. The time for the various points is entered in black and red. Black figures show time for runs in a northerly direction and red indicates time for southbound trips. When a crew takes out a car it is supplied with a run card for the particular run which it is to operate, and in checking operations inspectors check at the various time points and the crews are expected to maintain the schedule unless unavoidable delays occur. For convenience in checking the operation each car carries a run number in the right-hand front vestibule window. Inspectors are supplied with books containing all the various runs, so that they can turn immediately to the time when a car should be at a certain time point and thus check its operation.

This arrangement is also of particular use to other officials in getting in touch with crews or locating cars. Thus, if it is desired to get in touch with a particular crew, all that is necessary is to call up the dispatcher and find out the run that this crew has. Then by referring to the book it can be seen at a glance just where this crew is at a particular time. The same of course applies to cars. The location of a car at any particular time can be checked from the timetable card.

"Wired Wireless" Tried

New Duplex Current Used for Two-Way Conversation —Experiments Indicate Practicability of Using High-Frequency Current Communication

ON MARCH 26 the Third Avenue Railway, New York, in conjunction with the General Electric Company, demonstrated to a party of men the practicability of using "wired wireless" for establishing communication between any two points on the system. A laboratory set-up of a radio transmitting and radio receiving set was installed on a street car, with corresponding apparatus in the substation which supplied energy to the line over which this car was operated. Perfectly audible communication was conducted between the car and the substation from various points on the line, with the car either standing or moving.

The particular feature of this demonstration was the use of a duplex current whereby conversation could be carried on in either direction, just as it is done over the telephone. This was accomplished by utilizing two different frequencies. The transmitting set at one end and the receiving set at the opposite end were tuned for a frequency of 73,000, while the other pair of sets were tuned for 49,000 cycles. Currents of the two frequencies were thus conducted over the same wires, the trolley and feeder, without interference. By putting on the head phones of the receiving set and talking into a transmitter connected with the transmitting set, it was possible to receive and transmit without the use of any changeover switch.

The set-up in the street car consisted of an ordinary simple radio receiving set with one three-electrode vacuum tube, connected as a detector and another as an amplifier. The transmitting set made use of three type UV 203 tubes of 50 watts capacity. These three tubes were used as an audio frequency amplifier, an oscillator and a modulator. The power for the sending set was supplied by a 1,000-volt motor-generator set with the energy to operate it supplied by twelve cells of storage battery supplying approximately 24 volts. A similar set-up was used in the substation, except that in the receiving set only a single tube was used as detector and amplifier. In the substation, and in the car, the sets were connected to the trolley circuit through a condenser of low voltage drop.

The General Electric Company has been engaged in experimental work on the Third Avenue Railway for several weeks, to determine the constants of such a system, looking toward the development of suitable apparatus for utilizing high frequency carrier current for communication work. While it is possible to establish communication between any point on the system and any car suitably equipped with apparatus, the idea will be primarily to devise plans for communication between some central emergency office and line and trouble crews, construction and repair gangs, and perhaps such transportation men as starters and inspectors out on the system. The principal advantage of the wired wireless as compared to radio communication is that it requires much less input of power, and that while the current probably spreads over the entire overhead and feeder system, the radiation into the ether is very small so that it introduces practically no interference with any radio communication. The test was in charge of W. J. Quinn, electrical engineer of the railway company, and Edward Austin of the G. E. Co.

Tests of Welded Joints by the Boston Elevated Railway

Results of Compression and Bending Observations at Massachusetts Institute of Technology—Different Applications of Seam Welding

WIDESPREAD interest among electric railways and manufacturing companies is developing throughout the country in regard to the properties of welded joints. References have been made in this journal at various times during the past year to the organized investigation of this subject, which is being conducted under the auspices of the American Electric Railway Association, the American Electric Railway Engineering Association and the American Bureau of Welding in co-operation with the National Research Council and the United States Bureau of Standards. This investigation is proceeding along comprehensive lines, and in connection with it studies are being made of all available local data and information. At the request of the ELECTRIC RAILWAY JOURNAL H. M. Steward, superintendent of maintenance, Boston (Mass.) Elevated Railway, has consented to allow this paper to make public as information on this subject the results of a series of tests made by that company on arc-welded joints during the past year.

As a member of the executive committee of the joint committee on welded joints of the American Electric

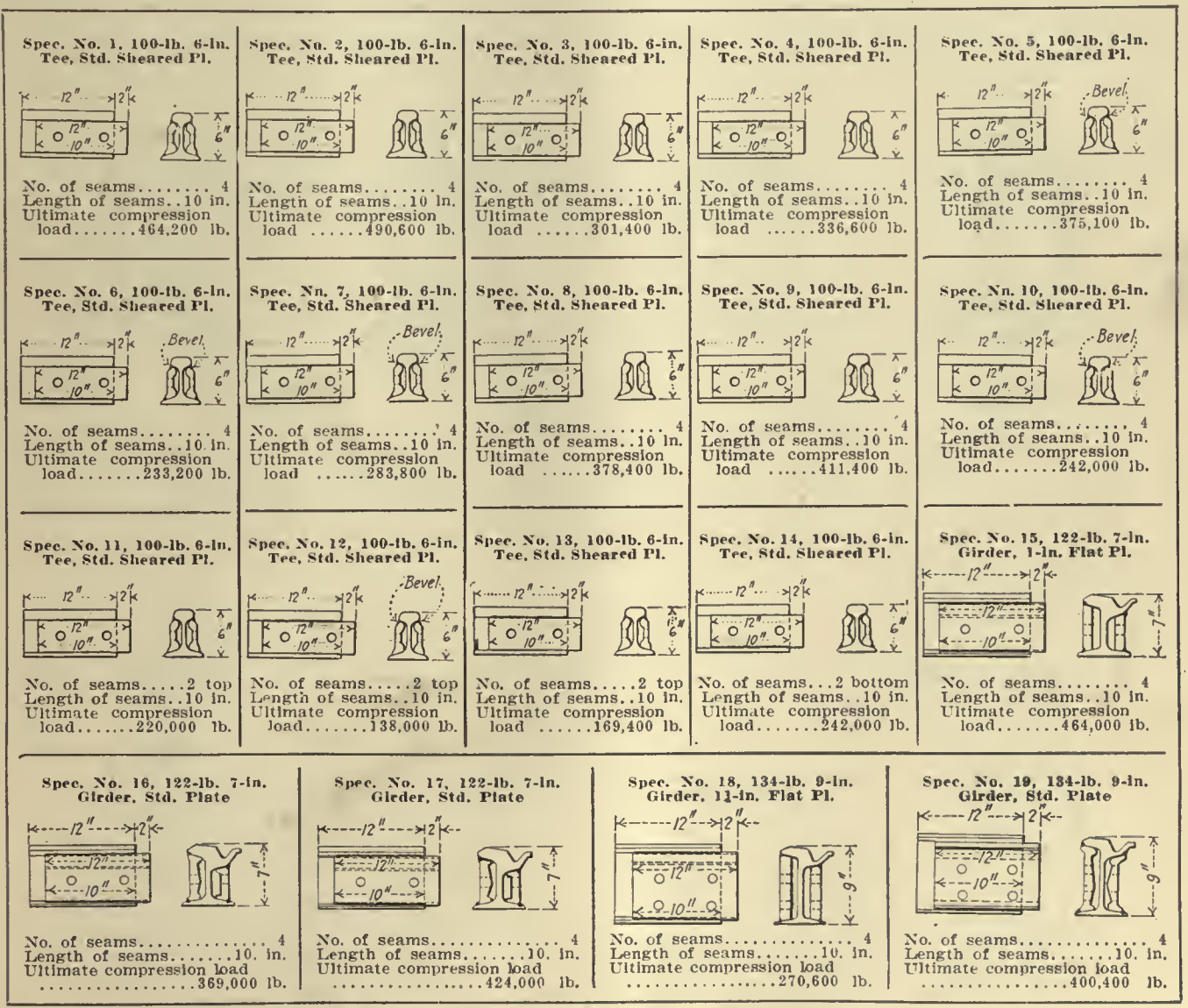


Fig. 1—Strength of Weld with Three Different Rail Sections

Railway Association and the American Bureau of Welding Mr. Steward has submitted data from these tests for critical study to other members of the committee and the comments of interested readers of this paper will be welcomed.

About 5,000 arc-welded joints are now being installed annually in new track construction by the Boston company. In order to obtain information as to the strength of such joints, arrangements were made to utilize a one million-pound testing machine of the Massachusetts Institute of Technology in the department of materials of engineering of that school at Cambridge. As the strength of the seam weld joint in tension was unknown and as no previous data on the subject were available, it was decided to use short sections of rail and joint plates rather than full-sized joints in order that the resistance to shear of the specimens would be well within the capacity of the testing machine. For this reason a seam length of 10 in. was selected. Tests were in compression, the rail section being pushed through the joint to shear.

The first set of tests, Table I, were made with three different sections of rail in order to obtain data on the strength of the weld. The standard Rail Welding & Bonding Company process of welding was used on all but three specimens, which were welded by the metallic process.

This group of tests was made with and without bevels and with seams at top and base of rail, and with seams at the top only and at the base only. Fig. 1 shows the cross-sectional appearance of each joint as arranged for testing. The average ultimate load sustained by seven specimens welded with carbon arc was 357,186 lb., the area of four seams being 10 sq.in.. and giving an unit stress in shear on the seam metal of 35,718 lb. per square inch.

Strengthening the Top Seam

Fig. 2 shows the arrangement of specimens and data secured from the second group of tests, which was made to determine if possible a method of welding that would strengthen the top seam of the rail joint. Five different types of plate bevel were tried. It will be noted in the above group of tests that in one case the bevel was applied to the rail as well as to the joint plate. These tests were all made with 100-lb., 6-in. tee rail, A. R. A. type A, two top seams being used in each case. Since the beginning of the use of arc welding by the

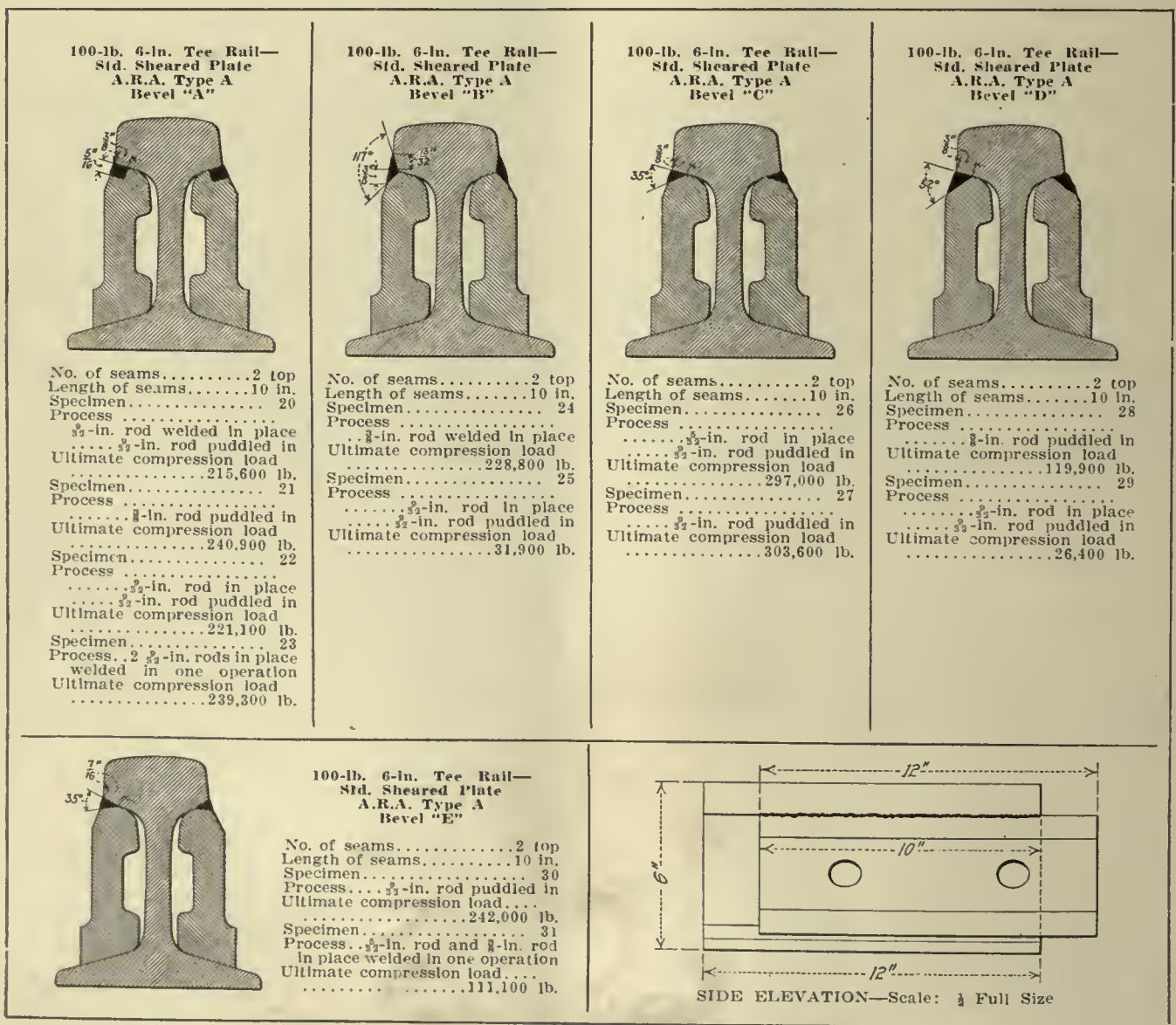


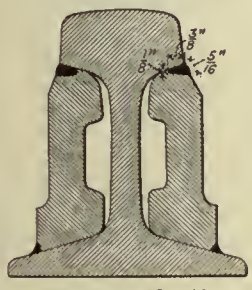
Fig. 2—Variations in Plate Bevel to Strengthen Top Seam

Boston company, all welding has been done by the standard R. W. & B. process.

For making comparative tests it was decided to use the so-called hand-feed process in welding. In this, the operator holds a welding rod in one hand and in the other a carbon electrode. After striking the arc on the seam to be welded, the end of the welding rod is fed into the arc. By this method it is possible to make a weld of any cross-section within certain limits by varying the quantity of weld metal fed into the arc. It was also decided to test a bevel head type of joint plate in order to compare the results with those from the flush head type of joint plate used on the previous tests.

An examination of the specimens after the tests were made showed that in some cases where the hand-feed process had been varied by laying a welded rod in place and feeding in extra metal from a second rod, the arc would not penetrate entirely through the rod in place.

100-lb. 6-in. Tee Rail—A.R.A. Type "A" Standard Joint Plates Top of Plates Beveled as shown



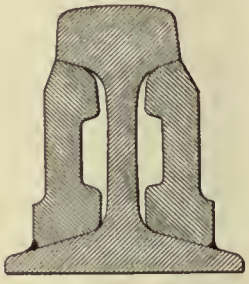
Specimen No. 40
No. of seams, 4.
Length of seams, 10 in.
Hand feed or puddled welds —1¼-in. welding rod per lin. inch of weld.
⅝-in. R. W. & B. welding rod.
Volts, 27. Amp., 160.
Ultimate compression load, 509,300 lb.

Specimen No. 41
No. of seams, 2 top.
Length of seams, 10 in.
Hand feed or puddled welds —1¼-in. welding rod per lin. inch of weld.
⅝-in. R. W. & B. welding rod.
Volts, 27. Amp., 160.
Ultimate compression load, 231,000 lb.

Specimen No. 42
No. of seams, 4.
Length of seams, 10 in.
Hand feed or puddled welds —1¼-in. welding rod per lin. inch of weld.
⅝-in. R. W. & B. welding rod.
Volts, 27. Amp., 160.
Ultimate compression load, 431,200 lb.

Specimen No. 43
No. of seams, 4.
Length of seams, 10 in.
Hand feed or puddled welds —1¼-in. welding rod per lin. inch of weld.
⅝-in. R. W. & B. welding rod.
Volts, 27. Amp., 160.
Ultimate compression load, 422,400 lb.

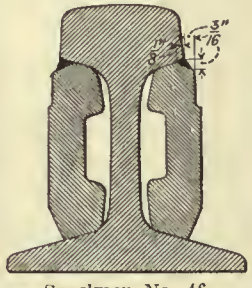
100-lb. 6-in. Tee Rail—A.R.A. Type "A" Standard Joint Plates



Specimen No. 44
No. of seams, 2 base.
Length of seams, 10 in.
Hand feed or puddled welds —1¼-in. welding rod per lin. inch of weld.
⅝-in. R. W. & B. welding rod.
Volts, 27. Amp., 160.
Ultimate compression load, 257,000 lb.

Specimen No. 45
No. of seams, 2 base.
Length of seams, 10 in.
Hand feed or puddled welds —1¼-in. welding rod per lin. inch of weld.
⅝-in. R. W. & B. welding rod.
Volts, 27. Amp., 160.
Ultimate compression load, 228,800 lb.

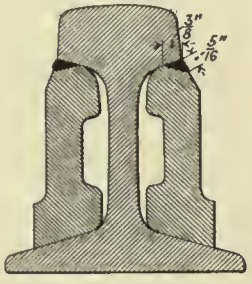
100-lb. 6-in. Tee Rail—A.R.A. Type "A" Standard Joint Plates Plates Bottom Side Up



Specimen No. 46
No. of seams, 2 top.
Length of seams, 10 in.
Standard process Carbon Arc weld—2 welds, second over the first.
⅝-in. R. W. & B. welding rod.
Volts, 35. Amp., 200.
Ultimate compression load, 247,500 lb.

Specimen No. 47
No. of seams, 2 top.
Length of seams, 10 in.
Standard process Carbon Arc weld.
⅝-in. R. W. & B. welding rod.
Volts, 35. Amp., 200.
Ultimate compression load, 226,600 lb.

100-lb. 6-in. Tee Rail—A.R.A. Type "A" Standard Joint Plates Top of Plates Beveled as shown

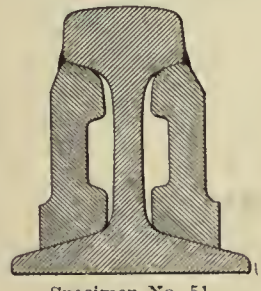


Specimen No. 48
No. of seams, 2 top.
Length of seams, 10 in.
Hand feed or puddled welds —1¼-in. welding rod per lin. inch of weld.
⅝-in. R. W. & B. welding rod.
Volts, 25. Amp., 160.
Ultimate compression load, 264,000 lb.

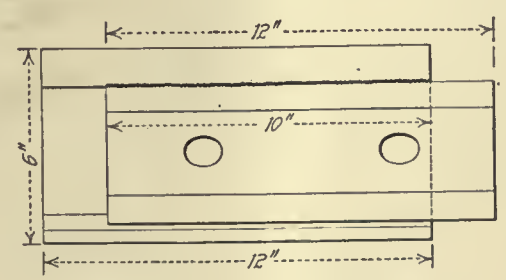
Specimen No. 49
No. of seams, 2 top.
Length of seams, 10 in.
Hand feed or puddled welds —1¼-in. welding rod per lin. inch of weld.
⅝-in. R. W. & B. welding rod.
Volts, 25. Amp., 160.
Ultimate compression load, 236,500 lb.

Specimen No. 50
No. of seams, 2 top.
Length of seams, 10 in.
Hand feed or puddled welds —1¼-in. welding rod per lin. inch of weld.
⅝-in. R. W. & B. welding rod.
Volts, 27, Amp., 150.
Ultimate compression load, 242,000 lb.

100-lb. 6-in. Tee Rail—A.R.A. Type "A" Standard Joint Plates

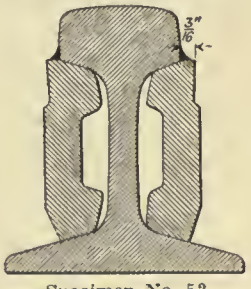


Specimen No. 51
No. of seams, 2 top.
Length of seams, 10 in.
Standard process Carbon Arc weld.
⅝-in. R. W. & B. welding rod.
Volts, 35. Amp., 200.
Ultimate compression load, 191,400 lb.



SIDE ELEVATION OF SPECIMEN

100-lb. 6-in. Tee Rail—A.R.A. Type "A" Standard Joint Plates Plates Bottom Side Up



Specimen No. 52
No. of seams, 2 top.
Length of seams, 10 in.
Hand feed or puddled welds —1¼-in. welding rod per lin. inch of weld.
⅝-in. R. W. & B. welding rod.
Volts, 27. Amp., 160.
Ultimate compression load, 260,700 lb.

Fig. 3—Comparison of Groove and "V"-Bevels

This occurred with specimens 20, 22, 25 and 29. In the case of specimen 31 it was found that the ends of the joint plates were uneven so that the strain was applied to one plate only.

As bevels "A" and "C" appeared more promising for further tests, eight specimens were prepared and sheared, with the ultimate load data given in Table II.

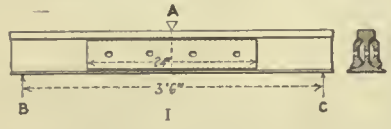
From this series of tests it appeared that as good results are obtainable with bevel "C" as with bevel or groove "A," the latter being too large a cavity to fill with welding metal with no corresponding appreciable gain in the strength of the weld. Some question exists as to the accuracy of the high strength figure secured by the carbon arc process followed by the metallic process (specimen 39, see table II), because an examination of the specimen after testing showed one of the joint plates had bent slightly inward and bound against the end of the rail, increasing loading to a certain extent.

GROOVE VS. "V"-BEVEL

The next set of tests, Fig. 3, was made for the purpose of comparing a groove applied to the top of the joint plate as shown in specimens 40, 41, 42 and 43 with a "V"-bevel as shown in specimens 48, 49 and 50. With one exception these tests were made with the hand-feed process. The exception was made with flush-head plates

Case I

6-in. Tee Rail, 100-lb. A.R.A. Type "A," Std. Joint Plates 24 in. long, seam welded full length. Bevel "A."



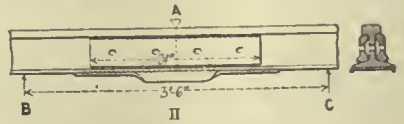
Rail supported at "B" and "C"

Load applied at "A"	Deflection in inches
5,000 lb.	.00
25,000 lb.	.06
50,000 lb.	.15
60,000 lb.	.26
65,000 lb.	See below

One joint plate broke at 65,000 lb. and test was discontinued.

Case II

6-in. Tee Rail, 100-lb. A.R.A. Type "A," Std. Joint Plates 24 in. long, seam welded full length. Base plate seam welded for length of joint plate. Bevel "A."



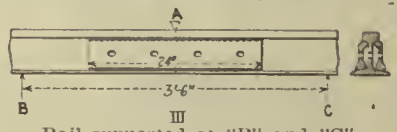
Rail supported at "B" and "C"

Load applied at "A"	Deflection in inches
5,000 lb.	.00
25,000 lb.	.03
50,000 lb.	.07
75,000 lb.	.13
100,000 lb.	.19
120,000 lb.	.25
140,000 lb.	.34
144,250 lb.	See below

At 144,250 lb. rail broke at end of joint plate and test was discontinued. All welds in perfect shape. Base plate slightly deflected at point of rail fracture.

Case III

6-in. Tee Rail, 100-lb. A.R.A. Type "A," Std. Joint Plates 24 in. long, seam welded full length. Bevel "C."



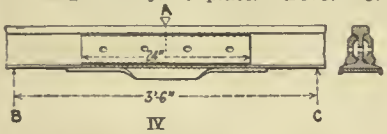
Rail supported at "B" and "C"

Load applied at "A"	Deflection in inches
5,000 lb	.00
25,000 lb.	.04
50,000 lb.	.11
60,000 lb.	.22
65,000 lb.	.28
99,700 lb.	See Below

One joint plate broke at 99,700 lb. and test was discontinued. Slight distortion in welds at point of joint plate fracture.

Case IV

6-in. Tee Rail, 100-lb. A.R.A. Type "A," Std. Joint Plates 24 in. long, seam welded full length. Base plate seam welded for length of joint plate. Bevel "C."



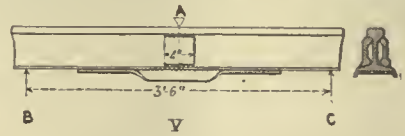
Rail supported at "B" and "C"

Load applied at "A"	Deflection in inches
5,000 lb	.00
25,000 lb.	.02
50,000 lb.	.07
64,250 lb.	See below

At 64,250 lb. rail broke 1 in. inside of joint plate base plate and test was discontinued. Base plate slightly deflected at point rail fracture. No fracture in seam welds.

Case V

6-in. Tee Rail, 100-lb. A.R.A. Type "A," 2 pcs. std. joint plate 4 in. long with base plate. Seam weld full length. Bevel "A."



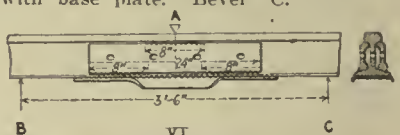
Rail supported at "B" and "C"

Load applied at "A"	Deflection in inches
5,000 lb.	.00
25,000 lb.	.03
50,000 lb.	.07
75,000 lb.	.13
105,000 lb.	.19
125,000 lb.	.38
135,000 lb.	See below.

Complete failure at 135,000 lb. rail broke 3 in. inside of end of base plate welds. Base plate slightly deflected at point of rail fracture.

Case VI

6-in. Tee Rail, 100-lb. A.R.A. Type "A," Std. Joint plates 24 in. long. Seam weld 8 in. top seam at joint 8 in. base seams beginning at ends of joint plate with base plate. Bevel "C."



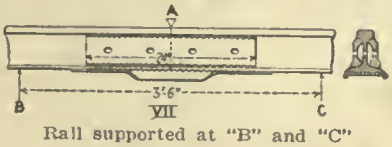
Rail supported at "B" and "C"

Load applied at "A"	Deflection in inches
5,000 lb.	.00
25,000 lb.	.03
50,000 lb.	.07
75,000 lb.	.11
105,000 lb.	.16
125,000 lb.	.26
135,000 lb.	.35
140,000 lb.	See below

Test discontinued at 140,000 lb. Rail broke 1 in. inside end of joint plate at end of base weld. Base plate slightly deflected at point of rail fracture.

Case VII

6-in. Tee Rail, 100-lb. A.R.A. Type "A," Std. Joint plates 24 in. long seam weld full length with base plate. Bevel "C."



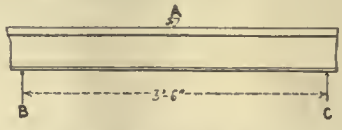
Rail supported at "B" and "C"

Load applied at "A"	Deflection in inches
5,000 lb.	.00
25,000 lb.	.04
50,000 lb.	.07
67,200 lb.	See below

Test discontinued at 67,200 lb. Rail broke 1 in. inside of joint plate.

Unbroken Rail

6 in. Tee Rail 100-lb. A.R.A. Type "A."



Rail supported at "B" and "C"

Load applied at "A"	Deflection in inches
5,000 lb.	.00
25,000 lb.	.03
50,000 lb.	.07
75,000 lb.	.11
100,000 lb.	.16
125,000 lb.	.22
160,000 lb.	.40
160,000 lb.	.51

Test discontinued at 160,000 lb.

6 in. Tee Rail 100-lb. A.R.A. Type "A."

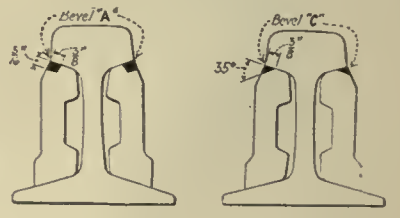


Fig. 4—Bending Tests to Failure of Arc-Welded Joints

TABLE I—STRENGTH OF WELDED JOINTS 2 AND 4 SEAMS

Spec.	Rail Sec.	Joint Plate	Bevel	Number of Seams	Length of Seams	Weld Steel	Process	Ultimate Comp. Load
1	6 in. tee	Std.	No	4	10 in.	9/32 in. Gr. 10	Carbon	464,200 lb.
2	6 in. tee	Std.	No	4	10 in.	9/32 in. Gr. 10	Carbon	490,600 lb.
3	6 in. tee	Std.	No	4	10 in.	5/32 in.	Metallic	301,400 lb.
4	6 in. tee	Std.	No	4	10 in.	5/32 in.	Metallic	336,600 lb.
5	6 in. tee	Std.	Yes	4	10 in.	3/8 in. top 9/32 in. base	Carbon	375,100 lb.
6	6 in. tee	Std.	Yes	4	10 in.	3/8 in.	Carbon	233,200 lb.
7	6 in. tee	Std.	Yes	4	10 in.	3/8 in.	Carbon	283,800 lb.
8	6 in. tee	Std.	No	4	10 in.	5/32 in.	Metallic	378,400 lb.
9	6 in. tee	Std.	No	4	10 in.	9/32 in. Gr. 10	Carbon	411,400 lb.
10	6 in. tee	Std.	Yes	4	10 in.	3/8 in.	Carbon	242,000 lb.
11	6 in. tee	Std.	No	2 top	10 in.	3/8 in.	Carbon	220,000 lb.
12	6 in. tee	Std.	Yes	2 top	10 in.	3/8 in.	Carbon	138,000 lb.
13	6 in. tee	Std.	No	2 top	10 in.	5/32 in.	Metallic	169,400 lb.
14	6 in. tee	Std.	No	2 base	10 in.	9/32 in. Gr. 10	Carbon	242,000 lb.
15	7 in. Gir.	Flat plate 1 in.	No.	4	10 in.	9/32 in. Gr. 10	Carbon	464,000 lb.
16	7 in. Gir.	Std.	No.	4	10 in.	9/32 in. Gr. 10	Carbon	369,000 lb.
17	7 in. Gir.	Std.	No	4	10 in.	9/32 in. Gr. 10	Carbon	424,000 lb.
18	9 in. Gir.	Flat 1 in. plate	No	4	10 in.	9/32 in. Gr. 10	Carbon	270,600 lb.
19	9 in. Gir.	Std.	No	4	10 in.	9/32 in. Gr. 10	Carbon	400,400 lb.

Average ultimate load sustained by specimens Nos. 1, 2, 5, 6, 7, 9, 10 (Carbon arc) ..... 357,186 lb.
Nos. 3, 4, 8 (Metallic) ..... 338,800 lb.

Area of 4 seams (carbon arc) = 4 x .25 sq.in. x 10 in. = 10 sq.in.

Unit stress (sbear) on seam metal $\frac{357,186 \text{ lb.}}{10} =$ 35,7181b. per sq.in.

TABLE II—ULTIMATE LOAD DATA FOR TWO BEVELS

Spec.	Rail Sec.	Joint Plate	Bevel	Number of Seams	Length of Seams	Weld Steel	Process	Ultimate Comp. Load
32	6 in. tee	Std.	A	2 top	10 in.	9/32 in. Gr. 10	9/32 in. rod hand fed in	314,600 lb.
33	6 in. tee	Std.	A	2 top	10 in.	9/32 in. Gr. 10	9/32 in. rod laid in place 9/32 in. rod puddled in	209,000 lb.
34	6 in. tee	Std.	A	2 top	10 in.	9/32 in. Gr. 10	9/32 in. rod and 5/32 in. rod	268,400 lb.
35	8 in. tee	Std.	A	2 top	10 in.	9/32 in. Gr. 10	5/32 in. rod laid in place 9/32 in. rod puddled in	231,000 lb.
36	6 in. tee	Std.	C	2 top	10 in.	9/32 in. Gr. 10	9/32 in. rod puddled in	301,400 lb.
37	6 in. tee	Std.	C	2 top	10 in.	Gr. 10	5/32 in. rod laid in place 9/32 in. rod puddled in	158,400 lb.
38	6 in. tee	Std.	C	2 top	10 in.	Gr. 10	5/32 in. rod welded by carbon arc process followed by 5/32 in. rod metallic process	231,000 lb.
39	6 in. tee	Std.	C	2 top	10 in.	Gr. 10	9/32 in. rod welded by carbon arc process followed by 5/32 in. rod metallic process	382,800 lb.

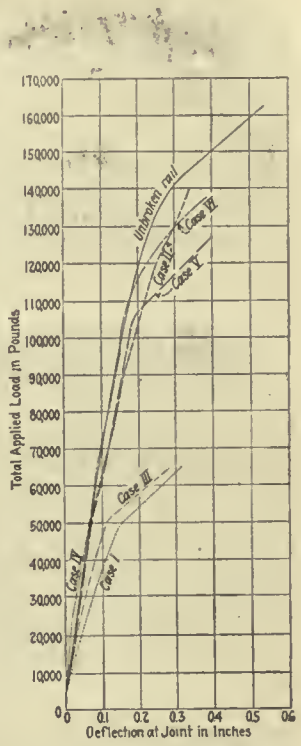


Fig. 5 — Load - Deflection Curves for Arc-Welded Joints and Unbroken Rail

and welded by standard process to check a previous test. Specimens 46, 47 and 52 were made with top seams only, the plates having a special bevel or ledge or combination of the two; also bevel "A" was modified in specimens 40, 41, 42 and 43 by making the groove smaller and so requiring less metal to fill the weld.

Specimens 46, 47 and 52 were made and tested at the request of the Rail Welding & Bonding Company, which furnished the details of the top bevel of the joint plate. To comply with this request it was necessary to use the standard joint plates bottom-side up in order to provide sufficient metal to form a groove or ledge as shown. The Rail Welding & Bonding Company desired these three tests to compare the merits of the hand-feed or puddled method to the standard process carbon arc weld. In each case the data as regards the energy consumption and welding rod used are given.

TABLE III—COMPARISON OF HAND-FEED AND STANDARD PROCESS METHOD OF ARC WELDING

Hand-Feed Process Welds	Pounds
Two top seams, "V" bevel, average load six specimens	264,916
Two top seams, groove, average load three specimens	262,166
Two base seams, average load two specimens	242,500
Four seams (two top and two base) average load three specimens	454,300
Standard Process Carbon Arc Welds	
Two top seams, no bevel, average load three specimens	193,600
Two base seams, average load, one specimen	242,000
Four seams (two top and two base) average load six specimens	397,100

The testing of specimens 46, 47 and 52 as varied somewhat from the Rail Welding & Bonding Company's instructions. These were to the effect that with the bevel shown in specimens 46 and 47 one weld should be made with the hand-feed process and one weld with the standard R. W. & B. process double weld, the standard R. W. & B. process being used with plates as shown with specimen 52, but in order to compare the single and double methods of welding, standard process, it was decided to apply this test to plates having the same bevel in order to get comparative values and the hand-feed process was used with specimen 52.

Summary of Compression Shear Tests

In analyzing and reclassifying the results of the entire series of compression shear tests to date, a comparison of the hand-feed and standard process method of arc welding gives the results shown in Table III.

Taking the average load of the four-seam specimen with V-bevel top seams, hand-feed process, and adding a value for the addition of a rail-joint base plate equal to the load sustained by the two seams, and using the result obtained as a basis of computation, a full-length joint of the same rail section as the test specimen, with standard joint plates, top of plates "V" bevel, with rail-joint base plate and all weld seams 22 in. long, should stand a tension strain of approximately 760,000 pounds.

Cross-Bending Tests

Cross-bending tests on full-size joint specimens were made to determine the value of a base-plate added to a seam-weld joint. The data on these tests are shown in Fig. 4, the joints being deflected to the breaking point in each case. For comparison, a deflection test was also made on an unbroken rail as shown, until a maximum deflection of 0.51 in. was reached, the load then being 160,000 lb. All these rail sections were uniform, a 100-lb., 6-in. tee being used with various bevels at the joints as indicated.

The details of the joint make-up were as follows:

Welds were made by the hand-feed process. The weld metal was R. W. & B. 5/32-in. rod, grade 10, and

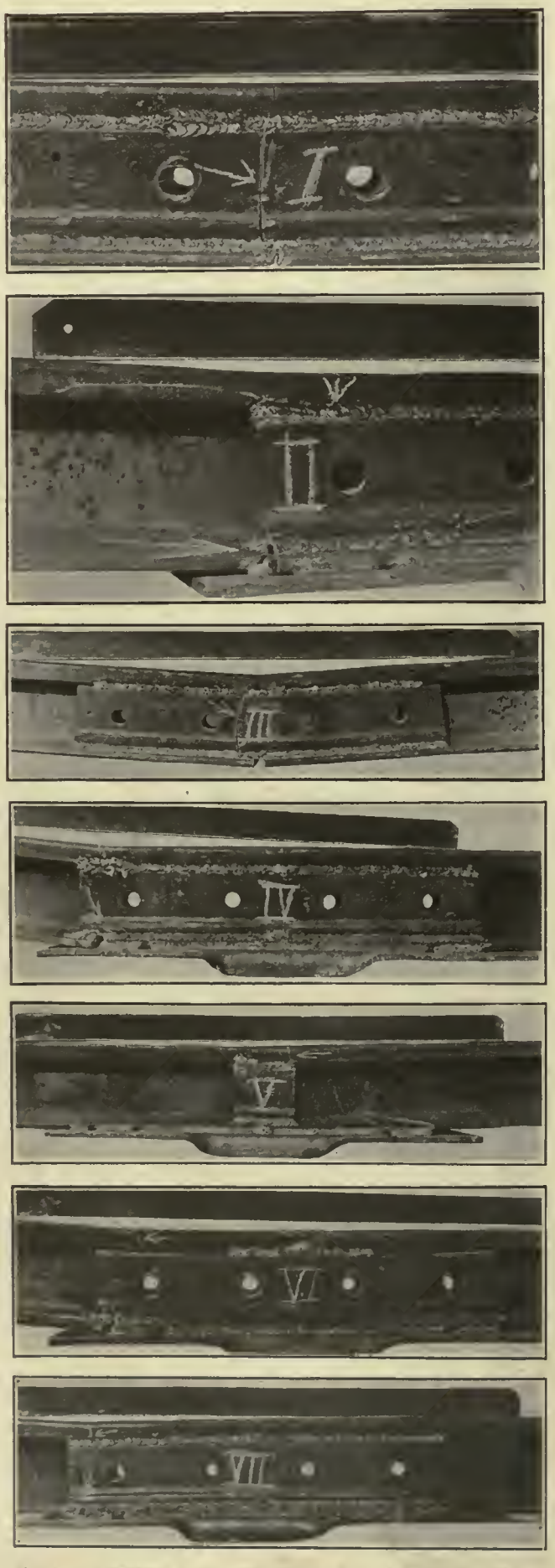


Fig. 6—Appearance of Arc-Welded Joints of Fig. 4 After Failure. The Number of the Specimen Is Shown in Chalk Marks on the Rail Section

approximately 1½ in. of rod was used per linear inch of weld. The power requirement was 125 amp. at 25 volts. All seam welds 24 in. long were equal to the length of the joint plates.

An examination of the joints after testing showed that the only fracture of the seam welds was at the point of rail failure and in no case was any distortion shown between rails and joint plates or between rail and base plates. Also, the deflection in the base plates occurred only at the point of rail fracture.

The relation between deflection and loads is shown in Fig. 5, and Fig. 6 shows the appearance of the joints in Cases I to VII, in Fig. 4, after being broken, to show where failure occurred.

Employees' Funds Total Nearly $2,000,000

Philadelphia Rapid Transit Company Employees Have Four Funds from Which Their Various Activities Can Be Financed

THE employees of the Philadelphia Rapid Transit Company have a co-operative savings fund, a co-operative benefit fund, a co-operative wage dividend and a co-operative helping hand fund. Each of these is for a different purpose, and the securities in each are kept entirely separate.

Co-operative Savings Fund

The purpose of this fund is, as its name implies, to provide an agency for the investment of savings. This fund was established in 1919. There are 7,572 depositors, having an average deposit after three years of $235. Much of this saving has come through the practice of the employees signing an order on the treasurer of the company to make a specified payroll deduction and deposit the amount in the savings fund. Deposits may be withdrawn upon two weeks notice, or in a shorter time when actual emergency is shown. The interest period is 5 per cent, made possible by the purchase of large blocks of securities during the post-war period. The interest paid on depositors' accounts during 1922 was $77,473. The investments composing this fund are as follows:

Par Value		Cost or Book Value
$218,650	U. S. Government and Federal Land Bank securities...	$214,204.47
50,000	Real estate mortgages...	50,000.00
465,000	Steam railroad bonds...	454,350.00
422,000	Equipment trust certificates...	417,439.98
661,000	Public utility bonds...	656,642.50
$1,816,650	Total investments...	$1,792,636.95
	Cash on hand...	3,667.37
	Total securities and cash...	$1,796,304.32

Co-operative Benefit Fund

The co-operative Welfare Association has a membership of 9,784, or 99.89 per cent of all P. R. T. employees. Its affairs are administered by the Co-operative Council, which also passes upon the validity and merit of all applications for pensions. This association is the medium through which sick benefits, pensions and life insurance policies are paid. The dues are $1 a month for a member, and the company contributes $1 for each dollar paid by the men, with a minimum of $10,000 a month.

Sick benefits are provided at the rate of $1.50 per

day, for a period not to exceed 100 days in any consecutive twelve months. Pensions of $40 a month are payable to incapacitated employees who have reached sixty-five years of age and have been continuously in the service for twenty-five years. Life insurance is covered by a group contract made with the Metropolitan Life Insurance Company, and each member has a separate insurance policy for $1,000.

It was from the surplus funds of this association that the employees purchased early in 1922 10,000 shares of P. R. T. stock. The report of receipts and expenditures for 1922 are as follows:

Cash balance—Jan. 1, 1922		$9,775.59
Receipts		
P.R.T. contribution ($10,000 per month)	$120,000.00	
Membership dues	117,887.00	
Interest and advances	56,182.60	
Securities sold	223,229.00	
		517,298.60
		$527,074.19
Expenditures		
Life insurance premiums	$127,373.22	
Pensions	70,038.70	
Sick benefits	59,241.75	
Wages and other expenses	25,498.40	
Purchase of 10,000 shares P. R. T. stock	238,330.95	
		520,483.02
Cash balance—Dec. 31, 1922		$6,591.17

Co-operative Wage Dividend Fund

This fund is the result of an agreement by which the management of the company agreed to pay the employees at the end of 1922 a bonus or "co-operative wage dividend," equal to 10 per cent of the annual wage earned by each, provided the company earned the sum required for such payment in addition to the amount required to pay the annual 6 per cent dividend on the $30,000,000 of P. R. T. paid in capital. Exclusive of this dividend, the basic hourly wage of the men is 62½ cents an hour.

The trustees of this fund are selected by the men from among their number, and 99.9 per cent of the employees signed orders instructing these trustees to use this fund for the purchase of P. R. T. stock. In 1922 ten thousand shares were first bought by the trustees, then 55,000 shares of stock were purchased and paid for out of the 1922 co-operative wage fund, making a total of 65,000 shares owned. Later 35,000 shares were purchased with money borrowed from the banks by the trustees of the co-operative wage dividend fund.

Certificates of participation in the stock owned are issued to individual employees. Such a certificate, at the time that 65,000 shares were owned, reads as follows:

65,000 shares Cost $1,650,000

Certificate of participation in 65,000 shares, Philadelphia Rapid Transit Company stock, held by the trustees, co-operative wage dividend fund.

This certificate is issued to and entitles..... while an employee of the company to 2½ per cent quarterly dividends, payable Jan. 31, April 30, July 31 and Oct. 31, upon the shares represented by this certificate, as long as the 6 per cent Philadelphia Rapid Transit dividend is paid.

Upon leaving the service of the company the owner of this certificate, or, in case of death, the owner's beneficiary, will receive at the option of trustees the shares represented by this certificate or cash to the amount of $30 per share for each share or fraction of a share thereof. By authority contained in resolution of Co-operative Committee, ratified by convention of all employers and employees' committeemen, the voting power of this stock is lodged in the trustees.

Dec. 30, 1922. This certificate is not transferable.

It will be seen that the employees own 100,000 shares out of 600,000 or one-sixth of the total capital stock of the company. The stock has a par value per share of $50, but is selling in the market for about $30 a share.

Co-operative Helping Hand Fund

This fund was organized in September, 1922, and is known as the Co-operative Helping Hand Fund. It was started to cover extreme and unusual cases of misfortune, where immediate financial assistance is necessary, as where a number of members of a man's family become seriously sick at one time. Here a loan scarcely answers, since the amount required would appear in the future to the employee an almost impossible barrier to a return to healthy financial condition. This fund has been made up by the payment into it of the profits of the annual picnic, $12,286, with $5,000 from the sale of the Philadelphia trolley route map, $6,000 from a benefit entertainment conducted by the men, and $1,000 from a helping hand tax of 5 cents per pound on the 15 tons of Christmas candy purchased by the men.

Pacific Electric Operates New Cars

FIFTY all-steel suburban type cars have just been shipped by the St. Louis Car Company to the Pacific Electric Company for use between Los Angeles and Hollywood. In the construction of the cars special attention was paid to their operation in trains, and they were provided with center sills capable of taking the pulling and buffing stresses incident to train operation. The center sills have an area of 8 sq.in. and the area of all longitudinal sills is 13 sq.in.

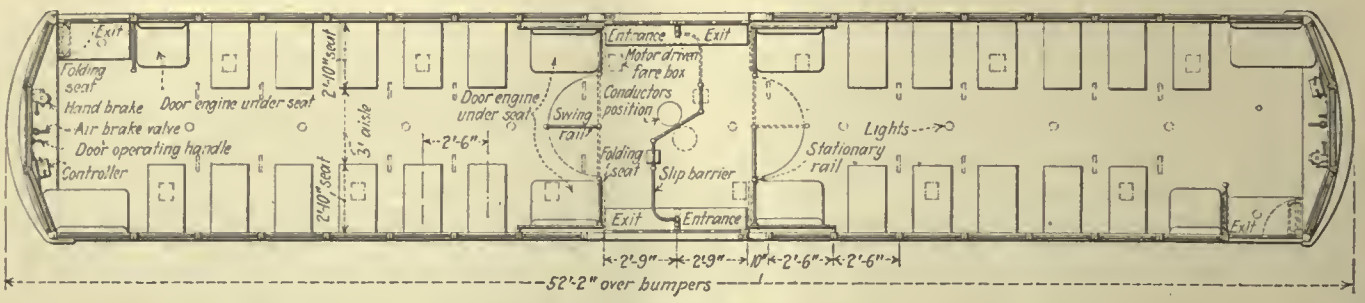
The floor system is supported on drawn steel members and consists of a light gage corrugated steel false floor riveted to the longitudinal members. Between the false floor and the main floor flaxlinum insulation is placed.



Wide Aisle and Seats and Center Entrance Are Features

The main floor is constructed of No. 22 gage Chanarch with Flexolith to a total depth of 1 inch.

The side frame is of the girder type with rolled tees for posts and patent leveled steel sheathing. The arch roof is No. 16 sheet steel with three-ply salamander insulation attached to the underside. The joint between roof sheets is made by flanging and gas welding the sheet be-



Floor Plan of Pacific Electric Cars

tween the angle carlines. The ceiling is of ¼-in. Agasote. The trucks are the St. Louis Commonwealth cast-steel equalized type. The adoption of the cast-steel frame is expected to reduce maintenance costs, as the side frame and transom are a one-piece steel casting. All joints between longitudinal and cross-members are fastened, which obviates the possibility of the truck getting out of square. The cars weigh completely equipped but 27,000 lb.

The cars have two doors at the center for entrance and exit and end doors at diagonally opposite corners for exit. The railing construction at the center is such that it can be swung to different positions so as to provide for great flexibility in connection with fare collection and the handling of crowds at terminals. The plan of operation is somewhat unique in that the forward portion of the car can be used as a pay-as-you-pass or as a prepayment section. The rear portion of the car is always used as a prepayment section. The pipe barrier at the center, which extends crosswise of the car from between the doors, is movable. Additional pipe barriers at each edge of the center portion can be swung 180 deg. and can be stopped and locked at either the right or left-hand side of the car or on the center line of the car. At terminals the platform barriers are swung parallel with the center line of the car and both center doors are used as exits. With the barriers swung to the left of the car, passengers are permitted to enter the forward portion without paying fare. This can be collected afterward, either from the passengers as they are seated or as they leave the car. This method is used only where large crowds are gathered. When operated in trains the end door of the first car is operated by the motorman for exit only.

The cars are equipped with four 50-hp. motors and provision is made for operating singly or in two and three-car trains.

High Efficiency of Boiler Fed with Pulverized Coal

THE United States Bureau of Mines has issued a preliminary statement covering tests of one of the boilers in the Lakeside station of the Milwaukee Electric Railway & Light Company. This is one of eight boilers equipped with the Lopulco pulverized coal system, supplying steam to two 20,000-kw. steam turbines. The complete installation in the Lakeside station was covered in an article in the issue of the ELECTRIC RAILWAY JOURNAL for April 15, 1922, page 633.

These tests were carried out by the fuel section of the Bureau of Mines, in co-operation with the research



New Pacific Electric Cars Are Arranged for Train Operation

department of the Combustion Engineering Corporation. The object of the tests was to determine the thermal efficiency, ease of operation and other particulars of a boiler with especially designed furnace and burners for burning pulverized coal. The boiler tested has 13,380 sq.ft. of heating surface.

Twenty-six tests were run at rates of heat transference varying from 4,000 to 8,000 B.t.u. per square foot of boiler heating surface per hour. The mean thermal efficiency attained was about 84 per cent, based on the gross calorific value of the fuel as fired. The efficiency varied little with the rate of steaming, and its high value is accounted for by the small loss from incomplete combustion and the small amounts of excess air, which varied from 5 to 36 per cent.

The coal burned had a gross calorific value of about 11,500 to 12,800 B.t.u. per pound and contained 2 to 5 per cent moisture, 33 to 36 per cent volatile matter and 9 to 13 per cent ash. It was so ground that 85 to 95 per cent would pass through a 100-mesh sieve. The ash had a softening point of 2,150 to 2,450 deg. F., but did not fuse together at the bottom of the furnace, because it was partly protected from the flame radiation by means of a series of water tubes connected to the boilers, which were placed between the furnace bottom and the flames.

The Readers' Forum

Saving Energy by Training Motormen to Handle Light Cars

ECONOMY ELECTRIC DEVICES COMPANY
CHICAGO, March 26, 1923.

To the Editors:

On page 515 of the ELECTRIC RAILWAY JOURNAL for March 24, in presenting my comments at the Illinois Electric Railway Association meeting when discussing the very interesting paper presented by C. E. Thompson of the North Shore on more comfortable rolling stock, your report might convey an impression contrary to my intent.

Comparing the energy consumption of a heavy interurban with the new light-weight type, I pointed out that the saving in car energy by the introduction of lighter interurban cars should be regarded from the same viewpoint as exists when older and heavier street cars are replaced by light-weight safety cars.

The safety car for city service ordinarily is designed for higher rates of acceleration and braking than were thought attainable when the old heavy street cars were built, and therefore, unless the motormen are instructed, and their methods of handling the controller and brakes are checked up, it is ordinarily found that full advantage of energy reduction through the use of the safety car is not realized. Of course there will come the characteristically lower consumption due to less weight, but there is also a worth-while saving to be made additionally if the motormen are properly trained to take full advantage of the higher rates of acceleration and braking that can be maintained with the safety car.

I desired also to leave the impression that with the newer forms of motors, control and brakes, a heavy type of interurban car could be operated with less energy consumption than the older type cars of the same weight, and likewise there was always available a further reduction for those roads which instructed and checked their men with a view to energy saving. I concluded my discussion of the Thompson paper with the statement that it was refreshing to have advanced ideas set forth at a convention by the representatives of a property which not only had thought out new things but had put them into successful practice.

L. E. GOULD, President.

The College Man in the Transportation Department

WORCESTER, MASS., March 17, 1923.

To the Editors:

Your editorial in the issue of March 10 on "A Place for College Men in the Transportation Department" brings forcibly to my mind the fable of the mouse that proposed to bell the cat; i.e., how do you expect the engineer to connect in the first place?

I grant your statement that this is almost a virgin field, but disagree with you entirely on the willingness of the young engineer to enter this department. With a few conspicuous exceptions, the engineer is not wanted there. Moreover, most railroad executives, having come up from the ranks, and being accustomed to dealing with organized labor, apply the seniority system too extensively. The young engineer, finding many inferior men ahead of him, and continually beset with ignorance, prejudice and custom, naturally gravitates toward less onerous conditions and greater opportunity.

Would it not be fairer to the young men about to graduate to point out to them the greater opportunities with the equipment and specialty manufacturers? Railroading in any department is fascinating work, but most of the railway engineering is done by the manufacturers, and most roads want "practical," that is, platform men only, as operating officials.

ROBERT G. TRUMBULL.

Question is made of how the engineer can be expected to fit in the transportation department. The JOURNAL stakes its faith in the young engineer rather than in the young college man with an A.B. degree, because the engineering training will enable the young man to understand how the tools used by his department to produce the thing he sells are subject to and must be adjusted with the requirements of the mechanical, track, power and line departments—all engineering in nature. Furthermore, the matter of graphing schedules and fitting service to traffic is one that will be readily understood by the engineer, but might be quite a problem for the unscientific mind.

Referring to the second paragraph of Mr. Trumbull's letter, this is all granted as a fact, but this is all the more reason that the subject should be discussed in order that railway men may give consideration to the fallacy of this situation and encourage new blood to enter the transportation department, and then to give it opportunity. One young college man lost heart in the transportation department because he was curtly informed that changes were not wanted; that the kind of men who were desired were those who were willing to carry on things as they are, not change them.

As to whether it would be fairer to the young men to direct their attention to opportunities with the equipment and specialty manufacturers is a question. It is

believed that the opportunity is distinctly great in the transportation department, provided that managements would give the same consideration in building up the personnel in this department that they have in others. If we were to admit that present conditions could not be remedied, then the JOURNAL would agree with Mr. Trumbull about the opportunity with the manufacturers, but the unsatisfactoriness of present transportation department methods and thinking is the very reason for calling attention to (1) the need for the railways to better the transportation personnel and (2) the opportunity for college men in that department.

—EDITORS.

About the Detroit Bulletins

MOUNT VERNON, N. Y., March 27, 1923.

To the Editors:

Socrates, as the wisest of mankind, realized how hopeless it was to exchange gibes with the playwright Aristophanes. One who enters the lists with an editor is in much the same position because the editor has the first page and the last word. Still, I'll take the chance.

Your editorial of March 3 found fault with me for quoting the opinions of the engineers of the Department of Street Railways instead of my own with regard to the condition of the property when taken over. I let this absurdity pass because the thoughtful reader knows that a person engaged seven months after the event cannot turn back the hands of Time even to please an editor.

Your editorial of March 24 finds fault with me for having opinions which do not coincide with yours. This is far more painful to me, so I will crave your indulgence to answer each of the points raised:

1. *Loss of Car-Miles Due to Trolley Wire Breaks.*—When I was on the editorial staff, I wrote editorials on the relation between equipment defects and lost car-miles. They were not questioned then. Of course, a car may complete its run within schedule time even if there has been a wire break along the line, but it will complete that run with fewer nickels. Have the editors forgotten that there is a pretty lively motor bus company in Detroit and quite a number of jitneys? Just watch those one-every-minute trains pile up on Woodward Avenue for nothing more than an ordinary traffic control stop and then tell me that a break in the trolley wire is a bagatelle. Are you finding fault with a recommendation that only the best be used?

2. *Percentage of Straight, Two-Piece and Three-Piece Runs.*—You are aware that the runs in Detroit have the consent of the platform men. If you do not agree with me that the runs in Detroit show skill as well as a decent regard for the men, I will refer you to your issue for Oct. 2, 1920, carrying an article by Edward Dana, general manager Boston Elevated Railway, on "The Scientific Arrangement of Schedules." On page 651 Mr. Dana says: "In Boston, 60 per cent of the runs are completed within eleven consecutive hours and 40 per cent between eleven and fourteen outside hours." Furthermore, Mr. Dana in a communication in your issue of March 17 shows that Boston's efficiency in man-power is practically the same as Philadelphia's. Detroit is in good company.

3. *The Single-End or One-Armed Car.*—You say: "His severe condemnation of the single-end car would indicate that many operators of large properties are wholly incompetent." You might as well have said this about any other bad feature which the present generation of electric railway managers has inherited, not originated. In your abstract you have me suggesting the early general rebuilding of all cars and track layouts to double-end operation. I suggest that you reread the bulletin, realizing at the same time that the exigencies of abstracting in haste and for limited space did the original report unintentional injustices. There is similar evidence of haste in the reference to lowered morale under the Detroit United management. This referred only to the peak of the bickering period and not to the days of relative peace.

4. *The True Fare Is What the Passenger Pays.*—I was content to say that the true average fare in Detroit was 5.33 cents, but you will not have it so. You claim 4.03 cents for January, 1923, and thus fall into the very same error which I was satirizing in my series of "supposes" that led to the mythical fare of 3.86 cents. In your haste you overlooked my main point, viz., that when a person pays 5 cents for his ride on the originating car and 1 cent on the destination car his fare for the trip is 6 cents and not 3 cents. You believe in the dilution of the originating fare by the transfer; I don't. Just try to convince the Detroit passenger that his fare is 4.03 cents! Who's the publicity expert for Detroit now?

WALTER JACKSON.

The author of the above letter has read into the JOURNAL editorial in question some things that were not there. Issue might be taken with each point in his letter referring to the editorial, but this seems unnccessary. Referring to his criticism of "one-armed cars," however, it is perhaps pertinent to note that the last 200 cars bought by the Detroit Municipal system were of the single-end Peter Witt type.

The abstract was not prepared in haste and it is believed to be a fair epitome of the original report. We are glad to have Mr. Jackson set forth his views in greater detail as above, however, if he thinks an injustice was done in the abstract.—EDITORS.

Proposed Automatic Substation in Cleveland Will Be Economical in Cost

THE CLEVELAND RAILWAY COMPANY

CLEVELAND, OHIO, March 21, 1923.

To the Editors:

Please note an error in the heading of the third installment of my article on "Automatic Substation Experience in Cleveland" on page 447 of the March 17 issue of the JOURNAL. It is pointed out in the heading, among other things, that the cost of the proposed station is to be 40 per cent less than the present structures. This should read 60 per cent, because you will note in the first paragraph on page 480 that I stated that the buildings may be erected for less than 40 per cent of the cost of the present substations.

L. D. BALE,
Superintendent of Substations.

The substantial reduction in fares which came into force last autumn on the Liverpool (England) Tramways has resulted in a considerable increase in the number of passengers, but despite this there has been a reduction in receipts of about £2,000 a week.

Association News & Discussions

Wisconsin Utilities Convene in Milwaukee*

Gas, Electric, Accounting, Sales and Railway Sections Meet in First Annual Convention of Consolidated Associations—Education, Track Problems, Selling Transportation and Automobile Accidents Hold Interest of Electric Railway Men

MARKED by enthusiastic joint meetings, and by enlightening separate sessions, the first annual convention of the Wisconsin Utilities Association, the consolidation of the gas, electric and electric railway associations, was held in Milwaukee, Wis., on March 22 and 23. Over 400 members and visitors registered for the two-day session, while the banquet reservation of 375 was exceeded on Friday night, the second day of the session. The mornings of each day were devoted to joint sessions, while the afternoons were devoted to meetings of the separate sections. All of the speakers expressed enthusiasm in regard to the prosperity they have experienced in the past year and the outlook for the continuation of this prosperity, which the people of Wisconsin and its industries are now experiencing. Every paper read in the separate sessions of the convention was thoroughly discussed by operating men in a whole-hearted, generous manner indicative of the interest.

J. P. Pulliam, vice-president Wisconsin Public Service Corporation, Milwaukee, and president of the association, in his opening address on Thursday morning, declared that the prosperity of public utilities reflects the prosperity of the communities in which they serve. Continuing, Mr. Pulliam said that there was more gas manufactured and more electricity generated last year than a year ago, despite the handicap of the coal strike and the continuous high cost of materials and labor. The public utilities of Wisconsin will spend between $25,000,000 and $30,000,000 in additions and improvements to their plants during 1923, in order to enable them to keep abreast of the ever-increasing demand for utility service.

Referring to the street railway situation, Mr. Pulliam said in part:

There is a much more hopeful atmosphere with our street and interurban properties. While unfair bus competition is still in evidence, there is the realization that the public can only get dependable transportation through the electric field. New equipment is being purchased, trackage extended and rebuilt, to the end that our business can be properly served. We should not lose sight of the need of the feeder lines in the sparsely settled districts which can be properly served for the present by bus, and after development of the territory trackage can be provided. We have not always looked upon our transportation field and our obligations as clearly as perhaps we should, with the realization that we occupy the field and should serve it, and we should use the buses to take care of that territory which is in the building. Bus transportation has grown tremendously in the state during the past year and to and from those communities which are not adequately served by electric and steam transportation there no doubt will continue to be a demand for bus transportation. In territories where buses are operating in opposition to well established electric and steam transportation, and where the buses are favored by the lack of comparative taxation, injuries are being done to the established companies. The question of taxation, however, is being considered and in due time when the bus companies so operating are subject to the same taxation program that is now placed upon the established lines their existence will not be for long.

Mr. Pulliam urged the utility representatives present to use every means to make the public acquainted with the facts concerning their problems. A record of the amount of newspaper advertising used by utilities in Wisconsin shows a substantial improvement over last year. This advertising, in his estimation, is of direct benefit to the companies, and utilities can make no better investment than to tell their story to the public fairly and honestly.

A paper by F. E. Schornstein, district manager Wisconsin-Minnesota Light & Power Company, Eau Claire, which was read by another, because of the author's illness, urged all public utility officials to join every community movement that had for its object any civic movement for the welfare of the people.

Following the reports of the various officials of the association and two-minute reports on the activities, aims and problems of various committees, an election of officers for the ensuing year was held. Harold L. Geisse, secretary and general manager Wisconsin Valley Electric Company, Wausau, was elected president; Bruno Rahn, vice-president, and G. C. Neff, treasurer.

At the general session the second morning James P. Barnes, president Louisville Railway, addressed the gathering on the three great words of the public utility business, namely, Co-operation, Publicity and Service. This appears in abstract elsewhere in this issue. Following Mr. Barnes on the program of the morning, John B. Maling of New Haven, Ind., in a speech resounding with patriotism, loyalty and Americanism, outlined the origin and effect of class and freak legislation.

He exhorted business men to take the lead in combating the influence of the agitators, parlor socialists and bolsheviks.

Electric Railway Session

B. W. Arnold, manager Eastern Wisconsin Electric Company, Oshkosh, presided at the separate session of the electric railway section on both afternoons. In his opening address Mr. Arnold spoke of the advantages of having joint meetings with the gas and electric men and belonging to such an association as the Wisconsin Utility Association. While the Green Bay meeting, held last August, may have had more railway men in attendance than the present meeting, he felt that the advantages of the joint meeting were greater than those of the separate meeting. O. A. Broten, National Pneumatic Company, Chicago, presented a paper on the pneumatic operation of car doors and steps, which is abstracted elsewhere. Nels C. Rasmussen, in discussing Mr. Broten's paper, brought out the fact that while his original equipment had the door engine underneath the floor of the car, this has been changed to the inside to prevent freezing of the engine. An alcohol anti-freeze font and wick has also been placed between the intake and the reservoir, eliminating freezing almost entirely. Referring to Mr. Broten's figures on time saving with pneumatic doors, J. P. Barnes thought there should not be too much optimism about this. He pointed out that the only saving in time that counts is when it amounts to enough to make it possible to take a car off and still keep the desired headway. He felt that door engines should be considered more as a convenience than as an economy.

Training of Employees

Edward J. Blair, Chicago Elevated Railways, made a short talk on the subject of education of employees as conducted on the elevated properties. From his own early experience on the Elevated, Mr. Blair felt that a general education of the personnel was necessary. Being a representative of the educational committee of the American Electric Railway Association, he explained in some detail the report of this committee and encouraged the men to read it. The problem which is con-

fronting the Elevated is to provide executives of the future. Mr. Blair asked the delegates if they could tell who on their properties would make a good general manager ten to fifteen years hence. Oftentimes it has been necessary for companies to go outside to provide themselves with the proper executives. However, this is not the attitute taken by the educational committee of the A.E.R.A. nor the Chicago Elevated, for it is felt that effort should be made first to get men from inside the company. It is the desire of the Elevated to start what will be known as an "executive school," taking men from the ranks, not college men, and giving them a liberal education of from three to four years and then putting them into minor executive positions. Although it seemed at first easy to pick the men, it was later found to be very difficult, for after six months of inviting groups into the general manager's office, only three men were selected.

At these meetings in the general manager's office the young men are invited to give suggestions and talk freely about their work or about ideas they may have in regard to the elevated system as a whole. After the selections have been made and three or four years of schooling has been undertaken by the men, during which time they will spend from three to four months in the various departments, the company will then have on one hand the college man and on the other hand the practical man. This, Mr. Blair feels, will lead to a friendly rivalry or competition between the two groups of men and the company will have jobs for all men who wish to stay and rise up in the organization of the company. During this schooling of the practical men they will receive their regular salary. It has been estimated that this course of education will cost the company $45,000, part of which, of course, will be collected in actual work performed by the men during this time. Co-operation with trade schools in the matter of apprentices is familiar to all, but the speaker thought this work should be carried on with men from colleges and a closer co-operation established between railway men and the state universities. He stated that it was hardest to handle the education within the company's own organization, although this could be accomplished to some extent by company section meetings, meetings on accounting and economics, and lectures by some outside speaker. In closing Mr. Blair called upon the men to make a careful study of the personnel of their companies for the jobs, not of tomorrow, but of ten years from today.

Mr. Blair's talk was discussed by J. P. Barnes, who said that many problems on the Elevated of which Mr. Blair had spoken did not apply to his road. Most all of his labor was American, as it was mostly colored. However, a special training had to be carried on for the white boss. With the colored laborer only three generations out of slavery, a grave responsibility fell upon the white boss. Education, to Mr. Barnes, was comparable to a crop, it being necessary to make a thorough analysis of the soil in order to get the best results.

Every job, in his estimation, should be understudied and the best way to do this is to give each man a trial. He spoke of a concern in which every job, from the general manager down to the office boy, was understudied by the man next lower in position. Whenever a man was absent due to sickness or out of town, all that it was necessary to do was to hire an office boy. If one of the officials should die or leave the company all the hiring that would be necessary would be another office boy. This has been successfully carried on for a great number of years.

Mr. Barnes felt that the trouble lies to a great extent with the executives, as they fail to understand the personnel of the company and the people they serve. Oftentimes the executive pays too much attention to the men who ride in automobiles and not enough to those who are the habitual car riders. A plan has been carried out by the Louisville Railway to have at least two or three men in every association in the city, the company paying the dues. This has been very worth while. It has also served for the company, as a means of selection, as it has been very easy to find out who the men were that had initiative enough to get up and get into the discussions carried on at these association meetings. Plans are now under way whereby meetings will be held at the universities in Kentucky and talks will be made by officials to the political economy classes on utility work. Professors at these universities are very eager to have the executives speak to their classes.

Mr. Fox of the Griffin Wheel Company made a few remarks in line with Mr. Blair's paper. He suggested that the young and new men be used in cases of emergency, possibly not to do the work themselves, but at least to sit in and see what the man in charge did.

Practice on Requiring Deposits

A general discusion was then held on the question of fare collection on the one-man cars, especially interurban cars, particular stress being laid upon the question of deposits by employees. Mr. Blair remarked that a deposit was required from all employees on his property for badges, etc., and this amount was carried on the liability side of the books. Mr. Burke of the North Shore Line stated that no deposit was required at the time of issuing materials to the men, this being taken care of by the accounting department in the pay roll, as each man receives his pay five days after the period for which he is paid. In this manner the company would always owe the man enough to cover any loss of company property. Mr. Arnold remarked that his company gave the men $13 worth of tickets and $7.50 in change, and required no deposit.

A round-table discussion was then held on how to handle transportation for employees. Mr. Barnes said that his company gave a sixty-ride book to all employees who make use of the city lines. They do not carry employees on their badge. J. A. Phelan, Rockford, Ill., remarked that his line carries the employees on their badges. However, the families of the employees are not carried free. After five years of service an annual pass, which can be used on the city and the interurban lines, is given to all employees. A special pass is given to city shop men, office employees have a fifty-ride transportation book. He also stated that they do not carry firemen nor policemen.

Mr. Arnold, the chairman, then asked the meeting to discuss the question of handling fares and issuing transfers on the one-man cars. Mr. Phelan of Rockford remarked that fares are collected as the passengers enter the car and transfers are issued as they leave the car at transfer points.

Mr. Barnes said that he had tried all methods, but found that the most feasible plan is to issue the transfer at a transfer point when the passenger leaves the car. The motorman is instructed to make change only when the car is stopped. A railing has been provided to keep passengers away from the operator, as a very serious accident occurred due to a passenger interfering with the operator while the car was in motion.

At the second session of the electric railway section Alfred A. Oldfield presented a paper on track maintenance problems of interurban railways. This appears elsewhere in this issue. Details in regard to laying Hedley grade crossings, and cautions about crossings in general were taken up in discussion on Mr. Oldfield's paper by J. S. Hyatt, Chicago, North Shore & Milwaukee Railroad. He remarked that a very satisfactory, inexpensive grade crossing can be made up of 4-in. x 6-in. planks and the use of this Hedley oil and sand. It has also been highly satisfactory to use this same oil in sealing of macadam crossings in order to keep the rain from seeping in under the macadam and freezing.

Mr. Hyatt diverged a bit from the subject of road material and spoke briefly on the extermination of weeds along the interurban roadway. His road had found it highly profitable to maintain a car especially devised for the extermination of weeds by use of a caustic arsenic solution. This seems to be the most satisfactory and should be applied directly after a rain, about four times a year, the idea being to keep the weeds from going to seed.

F. W. Shappert presented a paper on soliciting traffic which appears in this issue. Br. Barnes, indicating the manner in which his property sold transportation, stated that he wrote a personal letter to every family on a particular line at some time or other during the year and this was followed by a personal call of some official. This

tended to foster a spirit of friendship and co-operation between the party served and the operating company. C. E. Thompson, Highwood, Ill., stated that selling transportation is largely a question of public relations.

Automobiles and Accidents

R. M. Howard urged the railway men to seek the co-operation of automobile owners in an effort to promote the safety of the public. An abstract of Mr. Howard's paper is presented elsewhere in this issue. According to Mr. Burke, North Shore Line, the proper education of operators and drivers, by telling them what can be done to prevent accidents, is the only thing that will lower the accident hazard. Mr. Simmons, North Shore Line, in charge of the city line in Milwaukee, stated that his company had made it a point to compliment good drivers. This suggestion was made by the employees' safety committee. A check is being made by this company on drivers who do or do not look as they cross the right-of-way. It is felt that the claim department will profit greatly by such statistical records.

C. Allen, Green Bay, stated that all employees in his corporation are on a safety bonus. Every accident prevented gives the man credit, while every accident is to his discredit. Drivers of trucks and pleasure vehicles in Green Bay are on the same basis as the operators of the street cars.

In Louisville the question of automobile accident prevention has been gone into on a large scale by President Barnes. Accidents are classified in three classes: Those in which the responsibility lies with the motorman, those in which there is a question, and those in which the driver is wholly responsible. These are plotted on a map showing the location of the accident and who was responsible. A safety man is sent around to the various carhouses for the purpose of giving short talks on safety and explaining the accident chart to the operators. When this campaign was inaugurated, the motormen were responsible for 50 per cent of the accidents, but this has been reduced to such an extent that in the last month the motormen were responsible for only 30 per cent of all automobile accidents. By paying the expenses of an extra clerk at the State House during the registration for state auto licenses, a pamphlet was inserted with each license to every auto driver cautioning him about street car accidents and giving him the first rules of safety. After each accident Mr. Barnes sends a personal letter to every witness thanking him for the time and interest given to the case.

Interurban Track Maintenance Notes*

By Alfred A. Oldfield
Engineer of Maintenance of Way and Overhead Construction
Eastern Wisconsin Electric Company, Sheboygan, Wis.

PROBABLY one of the most frequent problems of the average interurban property which includes city construction and open trackwork is to reclaim track in some paved street. I frankly admit that we are still looking for a satisfactory solution, not only from the point of view of reclamation but also of cost. Invariably it resolves itself into the old problem of joints.

Good drainage is the first essential. After trying many methods we finally adopted the booster, with simple joint plates. We then built up the cupped rail and so far the results have been satisfactory. This work costs on the average about $15 per joint, exclusive of repaving work.

Special Work

Whenever possible we build up our special work with an oxyacetylene welder. Soft steel is put on in thin layers and finished with a hard steel layer. We use a steel brush for cleaning before welding.

As the properties on which I am engaged are going to lighter equipment on city tracks we are generally specifying hard-center iron-bound construction for frogs, switches and mates, but in some cases have bought solid manganese. On railroad crossings our specifications call for bolted construction, open-hearth steel, and heat-treated bolts. On open track special work, our specifications generally follow the manufacturers' but also incorporate some of our own details.

On open track, curves from 6 deg. up are guarded. The flangeway is 1¾ in. At 10 deg. the gage is widened ⅛ in. and the flangeway 1⅛ in. This proportionate increase of flangeway is carried out to a maximum of 2¾ in. Maximum widening of gage is ¼ in. On all city lines, curves are guarded, usually with a girder guard rail.

On the Oshkosh property we have kept our switches well drained and sparsely salted, and have not had any case of freezing. On our Sheboygan property the boxes were packed with grease, and oil was added periodically. Grease and oil collect too much sand and dirt. In future the former system will be followed. In this territory, where extreme cold weather is experienced, I consider that complete drainage of switches is a most necessary expense.

Paving

We are doing considerable concrete paving. Some of our past experience in Plymouth and Sheboygan has been disastrous, but I believe most of this failure was due to faulty track construction. We have recently installed on one of the approaches to the Eighth Street bridge at Sheboygan Dayton mechanical tie construction with a straight bar spot-welded to the web and base of the rail, and concrete pavement. On the opposite approach we installed wooden tie construction with bonded joints and standard angle bars, and also concrete pavement. We intend to build one-half mile of straight track this year in Oshkosh using Dayton ties and simplex joint plates with concrete pavement, and at the same time build one-half mile with cedar ties embedded in concrete with a concrete pavement.

Asphalt paving in contact with the rail has proved very unsatisfactory. The city engineer, the city superintendent of streets and my department are experimenting with various tarvia and other macadam fillers.

Track Maintenance Methods

On open trackwork where we are using all cedar ties, we have adopted a tie renewal program extending over six years. As the ties are put in each year a general resurfacing of the track is made. New ballast is used only where absolutely necessary. Last fall I experimented by taking a 2-in. raise on a mile of track, raising it on old ties and using no new ballast. So far it has held up, and today is much better than any other part of our track, including those sections where new ties were put in. At the time this track was raised no new ties were installed, although they were in very bad condition, but every spike was either replaced or reset. The track was entirely cleared of weed, good drainage given to the roadbed and the track was very carefully gaged. Considering the result obtained, we have decided to extend this experiment a little further and then add, say, 600 ties to the mile and gradually build up the ballast section. In five years' time our track again will be standardized, and during the process of rehabilitation it will be in good operating condition.

The main line turn-outs are to be entirely rebuilt. We have adopted a section 7040 split-switch turn-out with No. 9, 15 ft. frogs; 15-ft. switches with two adjustable rods; open side sockets with each point reinforced on one side with one stop; fourteen ½x6 in. slide plates with ⅝-in. pressed steel rail braces; two gage plates; six Morden adjustable rail braces; two gray iron heel blocks. Standard turn-out timbers are to be used.

Our switch lamps are electrically lighted from the trolley, the same contact being used for lighting telephone booths at each turn-out.

Until a few years ago I was very much opposed to the expense incurred in using chemicals for the destruction of weeds, but after making some very careful comparisons, I am fully convinced that it is cheaper to destroy the majority of weeds chemically. Where considerable rehabilitation of track is contemplated the weed killer is unnecessary, but for ordinary maintainance one and possibly two applications of weed killer during the year are very profitable.

The practice that we have adopted

*Abstract of paper presented before the Milwaukee convention of the Wisconsin Utilities Association, March 22-23, 1923.

for the construction of highway crossings on interurban tracks is to use 4 in. x 6 in. planks, with a 3-in. space between the planks in the middle of the track, this 3-in. space being filled up with macadam; a 12-in. plank is put on the outside of each rail. I find this more satisfactory than a full plank crossing, although the macadam filling requires some maintainance. I have recommended replacing old timber structures for culverts and bridges with reinforced concrete culverts or I-beam spans on concrete. I feel this expense is justified from the viewpoint of safety and maintenance.

On all our interurban tracks which originally were built with continuous joints, standard angle bars are being used, and concealed bonds are replaced by welded bonds wherever necessary.

The roadbed is considerably below standard, but it is gradually being standardized on a six-year program. The sub-grade is to be 16 ft., and particular attention is being paid to improvements in drainage, which undoubtedly will reduce maintenance cost.

The original curves are being spiraled, guard rails placed on all curves of 6 deg. or more and elevation given for 45 m.p.h.

Our standard rail section for all renewals is to be 70 lb. A.S.C.E. This has been decided upon with the advent of lighter equipment which is being purchased by our company. The new interurban safety cars weigh 34,500 lb.

Pneumatic Operation of Doors and Steps*

By O. A. Broten
Western Representative National Pneumatic Company, Inc.,
Chicago

THE advantages of pneumatic door control in street railway, elevated and subway transportation are indeed manifold, as every department is directly or indirectly benefited by them. This may sound like a very broad statement but I am sure you all will agree that it is *service* to the community that brings out the car riders. Pneumatic door and step control is a time-saving, labor-saving and passenger control safety apparatus, the use of which results in service to both the car rider and the railway company. For instance, the following figures, involving only the transportation and treasury departments, merely show what a few seconds actually mean in dollars and cents to the railway company. Pneumatic door control will actually save from one to five seconds per car stop, but using only an average of two seconds saved per car stop, we arrive at the following:

8	car stops per mile
2	seconds saved per car stop
16	seconds saved per mile
10	miles per hour
160	seconds saved per hour
18	hour car day
2880	seconds saved per day or
46	minutes saved per day or
7½	miles more car travel per day
30	cents average net revenue per mile
$2.25	additional net revenue per day
365	days
$821.25	additional net revenue per year

This would pay for pneumatic door control on quite a number of cars.

In addition to the advantages shown by these figures, the conductor is allowed more time for fare collection and passenger courtesies. He is relieved of considerable fatigue as his day draws on, helping to keep him fresh and alert for his contact with the public.

During the years when hand-operated door and step control was at its height, the hiring of platform employees was based to some extent on brawn; however, pneumatic control has eliminated this particular specification of man power, in that railway properties are now in position to employ platform men on the basis of cashiers and salesmen, with brains, common sense and personality more important than brawn.

Another important item is the matter of maintenance, which generally grows with the addition of apparatus. However, with pneumatic door control this has really been reversed. Pneumatic door engines operate the doors in exactly the same manner with each operation. Hand-operated doors are controlled entirely by the will of the platform employee and are subjected to considerable abuse throughout the day, which of course means that the doors and steps and the operating mechanism are made to suffer through excessive strain, breakage of levers, getting the mechanism out of adjustment, loosening the hinges, breaking the glass and various other such items. With pneumatic door control these items are practically eliminated.

Door engines are all manufactured with the door cushioning feature and adjustable speed. There are really three types of pneumatic control, viz., straight-pneumatic, mechanical-pneumatic and electro-pneumatic, each of which has its specific advantages for different types of operation. For remote control, or where the platform employee is stationed at some distance from the car door, electro-pneumatic control is the ideal operation. Where the operator is stationed closer to the door, either mechanical-pneumatic control or straight-pneumatic control would be the ideal operation, depending entirely on the exact features of door operation desired.

The matter of installation of pneumatic door engines is an item of considerable importance, as this affects the operation as well as the maintenance. With sliding doors the ideal location of door engines is on the car or platform floor, directly behind and adjacent to the door proper. On folding doors it is advisable to install the door engines in a header pocket above the doors, as this gives a direct connection to the door shaft, with the door engine and connections located in a position where dust and dirt will not collect.

Where there is not sufficient headroom to install a door engine above the doors the alternative is on the platform floor, using connecting rods and levers for transmitting motion from the engine shaft under the platform floor to the door and step shafts; however, any connections under a car are subjected to excessive wear. This brings out the point of installing door engines under the platform floor, which is without any recommendations whatsoever, as this materially reduces the life of the door engine because of the collection of sand and dust from the streets.

With reference to adjustment of door engines, as mentioned above, there was a time when all adjustments could be made from the outside of the door engine proper, but this proved so disastrous to the operating company that the adjustments were placed in such a position that the car crews could not regulate the doors themselves, which insures a uniform door operation, meeting with the approval of the responsible department and not of each individual platform employee.

Door engines can be adjusted to operate at almost any desired speed, governed by a safe door operation, and regardless of the size or the type of the door, with or without steps.

With reference to care of door engines, it is the experience of users that a general inspection and overhauling should be given the door engines at the same time that the periodical overhauling is given to the car in general, as every piece of apparatus placed on the car must have its required attention and overhauling.

I have experienced cases where door engines have been condemned because of sluggish operation, when upon investigation the difficulties have centered in the lack of proper lubrication, and scale and foreign substance in the air ports. It is simply necessary to clean out these air ports with the aid of crude oil, when the free air passage will bring new life to the door engine.

Pneumatic door and step control is the most flexible of any type of passenger control apparatus, in that almost any safety feature or any type of door operation can be secured by piping the door engine accordingly. For instance, the following features can be readily secured:

1. Doors cannot be opened until brakes are applied.
2. Release of brakes will automatically close doors.
3. Brakes cannot be released until doors are fully closed.
4. Doors cannot be opened until brakes are applied but can be closed at any time desired.
5. Through the use of pneumatic and

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interlocking safety control it is impossible to have current at the controller until all doors are closed.

The question of door engine weight has often been discussed, and I might advise that considerable experimenting with dozens of different kinds of tests was done before we were fully satisfied that it was not feasible to use the aluminum type of door engine due to the extreme difficulty in securing a metal which would be airtight.

Some Pointers on Soliciting Traffic*

By F. W. SHAPPERT
Traffic Manager
Chicago, North Shore & Milwaukee Railroad,
Chicago

MY CONCEPTION of a traffic manager's job is to sell transportation, to create a market for his goods where there is none, to analyze carefully local conditions and ascertain exactly what you have to sell, and then put up a strong, concise and convincing selling argument to prospective customers. To illustrate better, I will cite some specific cases of North Shore salesmanship.

Since the present management has taken hold of the North Shore Line we have greatly increased the number of chartered or special cars, which now amounts to several hundred special trains annually. Our traffic solicitors at Chicago and Milwaukee cultivate officials of various fraternal organizations, clubs, societies, etc., and arrange for reciprocal visits between such organizations as Kenosha, Racine, Milwaukee, Waukegan and Chicago. In every instance a representative of this office has accompanied the party to insure a comfortable trip. He actively mixes with the guests with a view of getting comments regarding the trip and is also keenly alert for tips regarding future pilgrimages and excursions. These tips are followed with extreme care to secure additional business.

Several years ago, when the writer first joined the North Shore staff, it was customary for a football captain or baseball captain to call up the office and arrange for a small party to some town along the line. Our solicitors now get in touch with the students of the various high schools, colleges and universities and write individual letters calling attention to the proposed game and work up enthusiasm that invariably produces chartered cars or special trains. I have in mind one of these trips, from the Lewis Institute, Chicago, to the Great Lakes Naval Training Station, which was increased in this manner from the original order of twenty round-trip tickets to 235 round-trip tickets.

Several years ago Jim Vaughn, a pitcher on the Chicago National League baseball team, was employed by the Nash motor works during the winter months. We arranged with the Chicago National League Baseball Club to have Vaughn pitch on a certain Saturday afternoon in May, and by securing the co-operation of the officials of the various manufacturing plants at Kenosha traffic was created in such volume that it was necessary to utilize fifteen cars to convey the party to Chicago and return.

We have been very successful in prevailing upon educators to make trips to various points on the line. During the past six years we have handled several thousand school teachers in chartered car trains.

The writer has successfully tried the experiment on several manufacturers of inviting students of engineering schools to make inspection tours to the large industrial plants at Kenosha and Milwaukee. The original trip called for a two-day schedule. This schedule has now been extended to an entire week and includes inspection of large plants at Gary, Ind.; Buffington, Indiana Harbor, Chicago Railway terminals, and Kenosha and Milwaukee plants. These trips are being taken by a number of the large universities throughout the central West. Last fall, through correspondence, we sold the idea to universities located 900 miles away from Chicago, with the result that various institutions and universities sent their engineering students over the North Shore Line for an educational trip. We handled eleven universities last fall and expect to increase this order to fifteen during the fall of 1923.

Some transportation lines merely cultivate the educators shortly before the convention or excursion, whereas this department cultivates these people twelve months in the year. In a number of instances this department has made hotel reservations, secured choice theater seats and made reservations for Pullman and parlor cars over steam rail lines for the party.

Our football business has greatly increased in the last few years due to the fact that we get directly in touch with the alumni and students of various schools and with the fraternities, giving them information on our superior service, dining cars, etc.

This department has arranged with the bar associations in various points in Illinois and Wisconsin and chambers of commerce for special trips and outings. In a great many instances our solicitors suggest to club officials that they invite their fellows to make reciprocal visits and our transportation department co-operates with the sales organization in making a pleasant trip which almost invariably results in new business.

About six years ago this department made an investigation at Winnetka as to why the school children didn't patronize the North Shore Line. One hundred and sixty inquiries by telephone developed the finding that 90 per cent of the parents refused to allow their children to patronize the North Shore because they thought it was not safe. Today we are getting 95 per cent of this business. This was accomplished largely through personal telephone calls, by which it was possible to convince parents of the extreme precautions to secure the greatest safety.

To sell transportation successfully it is absolutely necessary that close co-operation between the operating department and the traffic department be secured. It is impossible for a good traffic salesman to sell transportation unless the operating officials are awake to the fact that to increase earnings on a profitable basis it is necessary to render high-class service. High-class service includes operating trains on time, with thoroughly ventilated and clean cars and courteous, competent and neat appearing employees. Salesmen and ticket agents should be very careful not to misrepresent facts to the public, which is quick to resent misinformation. Selling transportation, in a good many instances, means selling a man his own mind. In other words, it means making a man want to believe what you want him to believe about your company. Elbert Hubbard once said that a man believes what he wants to believe. To make a man want to believe what you want him to believe is the art of selling transportation.

When an agent attempts to sell a prospective passenger a ticket he is not selling a piece of pasteboard. The pasteboard is not worth a small fractional part of the purchase price. The person holding the purchased ticket should have the feeling that his ticket guarantees a safe, comfortable and courteous trip to his destination. He should be made to feel that he has paid for a trip and is a guest of the company for the time that he is on the train. He should be thoroughly "sold." When he gets off the train he should feel greatly appreciative for the transportation that he has received.

The traffic salesman of your line has to sell complete trust and good will for his company. The holder of a ticket should be made to feel that he is entitled to more than merely a ride to destination. One satisfied passenger will sell more transportation to his friends in a week than a solicitor can in two weeks. Successful salesmanship means that a salesman should be able to understand human nature and adapt himself at all times to the moods of his prospective customer. This department is rather proud of the fact that the traffic staff has succeeded in building up a large list of satisfied customers, not only on the line but in cities located several hundred miles away from our line, and our distant friends boost the North Shore Line and greatly assist this department in selling the thousand-mile books and twenty-five-ride tickets as well as single fares. Through this medium we have greatly increased our passenger earnings.

*Abstract of paper presented before the Milwaukee convention of the Wisconsin Utilities Association, March 23, 1923.

The members of the Wisconsin Utilities Association are undoubtedly aware of the tremendous increase in the business of the North Shore Line during the past four or five years in handling merchandise. This campaign was started some five years ago by opening a small receiving station in an abandoned drug store at Sixth and Clybourn, Milwaukee. In the beginning we had some difficulty in convincing the merchants at Milwaukee that a trolley line could really handle merchandise. We overcame this prejudice by a persistent solicitation. Our solicitation force presented facts. We arranged to notify shippers and consignees of the superior North Shore service which, at that time, included prompt handling of merchandise from Milwaukee to Lake Bluff and points on the Area Division. After we had satisfied our Milwaukee friends that the North Shore could render a superior service, the management extended merchandise service to Evanston and later to Chicago. At the present time we are operating four receiving stations in Chicago and handling several hundred tons of merchandise daily on the system.

The North Shore is fortunate in having a president and general superintendent who are alive to the public needs, with the result that our solicitors are able to go out and sell North Shore transportation, which means the best service offered by any transportation line. Our damage claims are extremely low and our cost of transportation will bear most favorable comparison with any other common carrier.

The Problem of Collisions Between Cars and Automobiles*

BY R. M. HOWARD
Vice-President Wisconsin Railway, Light & Power Company, Winona, Minn.

THE automobile has introduced an accident hazard of such magnitude that automobile-street car collisions now account for more than 50 per cent of the total street railway accidents in the state of Wisconsin.

The almost universal use of air brakes has minimized the collision hazard with pedestrians and horse-drawn vehicles, the folding door which prevents passengers from boarding or alighting while cars are in motion has almost eliminated the step accident, but we have not found any way to dodge the fast-moving automobile, so our accident records show a constant increase from year to year.

Statistics pertaining to this situation are presented herewith.

Wisconsin licenses issued during the past five years are as follows:

Year	Autos	Trucks	Motorcycles	Total
1918	189,983	6,861	7,246	204,090
1919	226,093	10,888	7,223	244,204
1920	277,093	16,205	8,012	301,310
1921	320,477	21,264	8,423	350,164
1922	361,060	26,788	5,917	393,765

A total of 2,135 dealers' licenses were also issued in 1922.

During 1922, 361,060 automobile licenses were issued, or one for every 7.2 inhabitants, while the average increase in automobile licenses issued during the past four years is 42,769 per year. This increase, if continued for five or six years, will place more than 600,000 automobiles on the streets and highways of Wisconsin.

Street railways may look forward to a continual increase in the number of automobile collision accidents unless some plan is developed which will impress every auto driver with the necessity of exercising care in approaching or driving on streets where street cars are operated.

The accompanying record of automobile-street car collisions in Wisconsin indicates the advisability of some form of educational program which will reach the auto drivers.

From a percentage standpoint the record is not unfavorable, as the automobiles increased 90 per cent and accidents 65 per cent. Analysis of our accident reports indicates that more than 90 per cent of these accidents are due to careless automobile operation, and that not to exceed 10 per cent of the accidents leave a question of responsibility. We may obtain some improvement in the debatable 10 per cent by careful supervision and instruction of trainmen, but the 90 per cent caused by the auto drivers presents a larger and more difficult problem.

In our study of the 1922 accidents at La Crosse, we took a system map and placed a red tack at the point where each accident occurred. This brought out the danger points on the system. We are keeping a similar map for 1923. These maps are installed in the trainmen's room, and we hope will assist them in the work of reducing accidents.

We found that 65 per cent of the accidents occurred on 10 per cent of our trackage located in the business district. Further study indicated that the majority of accidents were due to parking cars near the curb, and were caused by autos turning or backing onto the car tracks immediately in front of an approaching street car, or that the parked auto at the curb forced the moving autos in front of or into the sides of the street cars. Abolition of the parking privilege in the business districts on streets where street cars are operated will reduce materially this accident hazard. It also will speed up both street car and auto movements.

The suggestion is offered that our member companies use their influence toward abolishing the parking privilege on car line streets in their business districts, and that our association consider the advisability of arranging for the insertion of a safety bulletin in license plate envelopes to insure their receipt by every auto owner, or if this cannot be arranged, to secure addresses and mail a bulletin to each auto owner in the state.

*Absiract of paper presented before the Milwaukee convention of the Wisconsin Utilities Association, March 22-23, 1923.

ACCIDENT DATA—STATE OF WISCONSIN
(City Lines Only)

	1922	1921	1920	1919	1918
Car-miles operated	34,469,690	32,831,916	33,694,023	30,870,393	34,028,371
Passengers carried	246,809,978	248,288,805	264,283,189	246,578,129	222,187,616
Total transportation accidents	11,279	11,257	12,247	9,636	9,438
Auto collisions	5,780	5,522	5,662	3,997	3,497

Co-operation, Publicity and Service*

BY JAMES P. BARNES
President Louisville (Ky.) Railway

A SHORT time ago I made a few inquiries about the attitude of the public toward the utilities in the State of Wisconsin. In the answer which I received this phrase struck me particularly: "Some people in this state still have an idea that the average public utility men wear horns."

Now this phrase was written to me by a man whom I had never seen, who had never seen me and with whom this was my first correspondence. However, I understood what he meant because we use the same language, although accustomed to different colloquialisms. Reflection along this line brought me to realize, perhaps more clearly than usual, the fact that the good will of the public-utility business is, after all, founded on the element of understanding.

Public-utility men are sometimes too impatient with the straightforward, honest-intentioned business man who fails to understand their problem because they do not state it in his language. The public utility business has a highly specialized vocabulary. For example, we speak fluently of "return on investment," or "return on fair value of property," yet we refer infrequently to the fact that in our business the usual rate of gross earnings is from 15 per cent to 30 per cent annually of the amount invested in the property. The merchant or manufacturer usually turns over his capital from two to ten times annually. I have known a thoughtful man positively to gasp at the thought of an industry which requires from three to six years to turn over its capital, in some cases even longer. Such realization in most cases immediately enlists his sympathy with our problems and brings about co-operation.

This spirit of co-operation must permeate the investor and management,

*Abstract of address before meeting of Wisconsin Utilities Association, Milwaukee, Wis., March 22 and 23, 1923.

and in addition the employees and the customers of the property. Co-operation cannot be built on any basis other than that of mutual understanding of their common problems, and this understanding cannot be obtained without publicity. Publicity is a two-edged sword, but its use is essential and indispensable to the understanding and confidence upon which a successful public utility must be built. Like the legendary sword of King Arthur, publicity is a sharp, powerful and dangerous weapon, but it carries for its user a charm of protection if he but understands its spell. The formula for self-protection in its use can be expressed in one word: "Honesty." This will, in turn, bring justice.

The operator who will tell the truth about his business—its trials, difficulties, triumphs and successes—telling this story as news when it is news, as paid advertising when the purpose of the copy is advertising or propaganda, will find building up behind his property a public opinion based on confidence and sympathy of understanding, which will stand the test when the crisis comes.

Employees May Become Effective Publicity Agents

Publicity is of many kinds. Publicity through the newspapers, news stories and advertisement, is indispensable, but there is a subtler form of publicity disseminated through the contact of employees with the public, particularly in the street railway business, which is extremely powerful and often unappreciated. Employees are human beings and their impressions of the utility corporation, formed from their daily contacts with it, are often surprisingly accurate. These impressions will find frequent expression, consciously or unconsciously, in conversations with other people. Thus those with whom the employees talk will form opinions of your corporation and men, based very largely upon what your employees say and what they leave unsaid. We come back to the first rule of good citizenship, namely, that "our first duty is to put our own house in order." No detail is too small and no policy too large to be frankly discussed with and completely explained to any employee who has sufficient interest to inquire into it.

Summing up the whole proposition, it seems to me that success for the public utilities depends for the individual company on co-operation and publicity as to its affairs, both based on the sympathy of understanding arising from frank expression and discussion. Similarly, in a broader sense, the more the railways know of lighting and power problems and the more the telephone people know of railway problems, the closer we get together, the more intimately we discuss matters of policy, the better will be the investing, employee and public reaction to the public utility industry as a whole.

On the foundations of understanding, co-operation and publicity, with addition of courtesy, is built public service, our sole reason for being in business.

Too many men appear to conceive the sole function of management to be the payment of dividends. They forget that this obligation is but secondary, in the sense that dividends are only truly concerned when the public is served. The public service will stand as the goal of operation as we realize that today abide these three: co-operation, publicity, service, and the greatest of these is service.

American Association News

Power Distribution Engineers Meet in Chicago

A TWO-DAY meeting of the Engineering Association committee on power distribution was held in the Edison Building, Chicago, March 12 and 13. On March 12 six subcommittee meetings were held, three each morning and afternoon. The second day was taken up with a general meeting of the committee, at which the reports of subcommittees were considered. Those present were Messrs. M. B. Rosevear, chairman; J. W. Allen, R. L. Allen, L. W. Birch, H. G. Burd, L. E. Delf, D. D. Ewing, C. L. Hancock, C. J. Hixson, C. H. Jones, F. McVittie, W. Schaake, A. Schlesinger, J. Scott, F. J. White, C. R. Harte, sponsor, and A. Hughes, Jr., who acted as secretary.

Ralph H. Rice, Chicago Board of Supervising Engineers, and D. L. Smith, Metropolitan West Side Elevated Railway, also attended the meeting.

On the specifications for catenary construction other than for steam railroad electrification, Mr. Jones reported that the preliminary specification drawn up in 1921 is being carefully studied in sections by members of the subcommittee and that redrafts of all parts of the specification have been made and will be presented at the May meeting of the committee.

Mr. Murphy reported that progress is being made on the subject of trolley wire specifications, with a view to harmonizing the specifications of the association with those of the A.S.T.M., and ultimately to presenting a specification for adoption as "American standard" through the A.E.S.C. A questionnaire will be sent out to a selected list of railway companies to collect information regarding trolley breaks occurring from causes other than wear. Current-collecting devices will also be considered, and, if possible, a joint conference with the equipment committee will be held for the purpose of considering how best to deal with the current-collecting problem.

As to the Engineering Manual, the committee prepared a request to the executive committee to consider binding the Manual in three volumes, dealing respectively with roadway, equipment and electrical matters (power generation, power distribution and signals). It was thought that in this form the Manual would be more convenient than if bound in one volume.

Mr. McVittie stated that on the subject of trackless trolley the report will be confined to a historical summary of the development in this field, the description of each installation to be approved by the operating company before inclusion in the report.

The chairman announced that the association representatives on the technical committee which has been formed in connection with the revision of the crossing specification under the auspices of the A.E.S.C., will be as follows: On hazards, Mr. Harte; on clearances, Mr. McVittie; on definitions, Mr. Pharo; on underground construction, Mr. Rosevear. He also stated that the subjects of wood poles and tubular iron poles, which have been referred to the A.E.S.C., had been in turn referred to special committees, but no reports have as yet been received from these. Another subject referred to the A.E.S.C. was that of wires and cables, regarding which Mr. White, who is secretary of the sectional committee, reported that there were twelve technical committees handling this subject, some of which have been active and others inactive. Mr. McVittie stated that little progress has been made since the last report on the subject of lightning protection, which is also in the hands of the A.E.S.C.

There were some general discussions regarding conductivity of aluminum, on which a research committee and a policy committee have been appointed. It seemed to be the consensus of opinion that the standard for aluminum should be based upon copper, in spite of the fact that changes in conductivity, due to temperature variations, in the two metals are not parallel.

The committee also discussed inductive co-ordination and temporary connections to trolley wire for apparatus using heavy current, and reviewed certain of the power distribution specifications which are in the Manual.

The committee adjourned to meet in New York City on May 21 and 22.

Regulation of Motor Buses and Trucks

THE special committee of the American Association on motor buses and trucks, under the chairmanship of Philip H. Gadsden, met in New York City on March 28 with a good attendance of members of the committee and guests. Among those present were representatives of the United States Chamber of Commerce and the National Automobile Chamber of Commerce. A preliminary draft of a report, prepared by Harlow C. Clark, covering the whole subject of the committee's assignment in a general way was carefully reviewed. Plans were laid for the compilation of data regarding the electric railway industry which will show its magnitude and the nature of the service which it is rendering to the public.

Maintenance of Equipment

Steel Trolley Wire Replaced

New York, Westchester & Boston Has Changed Material of Contact Wire on Account of the Deposit of Rust on Cars—Porcelain Insulators Have Replaced Wood—Hangers Now Bolted

WHEN the New York, Westchester & Boston Railway was originally built in 1910, a departure from customary practice was made by using steel instead of copper for contact wire in the overhead construction. The low voltage d.c. power in general use on electric railways at that time necessitated copper trolley wire, but it was thought that with high voltage a.c. power, it would be feasible to use the cheaper material. Recently, however, this company has been replacing the old steel contact wire with phono-electric wire, and on new construction only the latter wire has been used.

The overhead system of this property is similar to that in use on the New York, New Haven & Hartford Railroad between Stamford and New Haven, on the Harlem River division of that road and elsewhere. Three wires in the same vertical plane are used over each track. From the topmost, or catenary, messenger are suspended by hangers a pair of parallel wires about 2 in. apart. The upper of the two parallel wires is the straight messenger, and the lower is the contact wire. All three wires are alive, and power is supplied at 11,000 volts at the anchor bridges about 9 miles apart.

Size No. 0000 grooved steel wire was used for the contact wire when the road was first built. No trouble has ever been experienced on account of the lower conductivity of steel as compared to copper. The freedom from this trouble may be due to the fact that the power demands have never closely approached 100 per cent of the line capacity. But it has been found that the steel wire rusts badly, especially in the groove. This defect was considered so serious that all replacements and extensions are now being made with No. 0000 phono-electric trolley wire. At present about 36 miles of the latter are in use, and only about 21 miles of the old steel wire remains on the upper end of the White Plains branch.

The use of steel contact wire produced a most undesirable result in another direction. The friction of the steel shoe of the pantograph against the steel of the contact wire caused a steel oxide dust of some sort resembling iron rust to be deposited on the roofs of the cars. There was not so much objection to the presence of the iron oxide on the roof, but when it rained, this substance was washed down onto the sides of the cars, quickly giving even a newly painted car a very drab appearance. No method of cleaning has been successful in removing this discoloration. A car fresh from the paint shop could hardly be distinguished at the end of a month's time from any other car on the road.

In the ELECTRIC RAILWAY JOURNAL of May 18, 1918, appeared a description of the way that special gutters along the roof had been applied to remedy the difficulty. But even this step did not wholly prevent the trouble. The use of phono-electric contact wire, however, has reduced to a marked degree the deposit of rust on the roofs of the cars. The original dark green color of the paint is preserved longer and it is expected that the trouble will be entirely eliminated as the use of alloy wire is extended.

PORCELAIN STRAIN INSULATORS SUBSTITUTED

Another change which is being made in the overhead construction of the New York, Westchester & Boston is in the type of span wire insulators. Wood strain insulators were used at first, but their maintenance has been so expensive that porcelain insulators are now replacing them at the rate of 300 to 400 a season. In damp weather there was considerable current leakage across the surface of the wood. This charred and burned the material until at length it was so weakened that it could no longer stand the strain. In order properly to maintain a wood insulator it was found necessary on this property to take it down at least once in two years, sandpaper the surface thoroughly and give it three coats of varnish. On the other hand, a porcelain insulator needs almost no further attention after being once installed, and is therefore more economical in the long run.

LOOSE HANGERS ELIMINATED

Some trouble has been experienced on the N. Y., W. & B. at times from loose trolley hangers. The vibration caused by the passing of the pantograph along the wire loosened the screws which held the hangers clamped to the wire. To obviate this trouble, the screws have now been replaced by bolts and lock washers. Since the change a loose hanger is an almost unknown thing on this road.

Weather Protection for Joint Plates Pays

THE Market Street Railway of San Francisco recently bought 1,200 pairs of joint plates in preparation for track reconstruction now contemplated and stored these plates in the material yard awaiting use.



Inexpensive Housing Over Storage Pile of 1,200 Joint Plates

As it will be at least several months before all of these will be required, a pile was made at a point convenient to a spur track and a light frame shed, with tar paper roof, was erected over the pile.

The shed was built at very little labor cost, with old lumber available in the yard, and will prevent the rust and scale that accumulates rapidly on new metal exposed to the weather.

Removing Grease and Dirt from Compressor Parts

A NUMBER of railways use hot lye for cleaning dirty and greasy metal parts, but its use in compressor overhauling is not generally practiced. The equipment, however, for carrying on this work is simple and easy to construct and the results obtained far outweigh the cost necessary.

The New York Consolidated Railway overhauls all its air compressors on a time schedule which brings them in about once every fifteen months. The compressors are entirely dismantled, and before any work is done toward replacement or repairs the parts are thoroughly cleaned. To do this all parts except gears, pistons, crankshafts and connection rods are placed in a tank containing a cleaning solution. Two tanks constructed of sheet iron are used for the cleaning work. They are the same size, being 41 in. x 32 in. x 31 in. high, set on a framework which brings the bottoms 9 in. above the floor and having angle iron corners to provide for stiffness and convenient riveting. A 2-in. x 2-in. angle iron is used at the bottom. The legs are also made of 2-in. x 2-in. angle iron and there are three on each side. A 1½-in. flat strip helps to steady the legs and form a more rigid support. One of these tanks is used for the hot cleaning solution, the other is a rinsing tank, in which cold water is used.

The tank containing the cleaning solution has a gas heating equipment which consists of three long burners installed underneath the tank. Also, in order to circulate the cleaning solution and provide for proper mixing, an air connection is led into the solution at one corner. Air is injected at an elbow near the bottom which has a plug with a large number of holes in it. Two sheet-iron covers with proper handles are used to cover the cleaning tank while the various parts are being cleaned. Ordinarily the parts are left in the solution about one-half hour. The large parts are handled by an overhead air crane and the small parts are placed in the solution by hand after ropes have been attached to them so that they can be conveniently removed. Small bolts, washers, nuts and the like are placed in an iron receptacle which is filled with holes so that the cleaning solution readily enters it. The cleaner used at present is furnished by J. C. Ford of Wyandotte, Mich., and 20 lb. of the cleaning powder is used to 100 gal. of water. About every other day 2 lb. of cleaning powder and 10 gal. of water are added.

After the various parts to be cleaned have been in the cleaning solution for a half hour they are removed and brushed briskly with a hand brush or a broom and are then placed in the rinsing tank. Large parts are raised and lowered in the rinsing water by means of the overhead hoist, and the smaller parts are moved around so as to give them a thorough rinsing. Cold water is continually flowing into and out of the rinsing tank, and an overflow is made with a 1-in. pipe connection and the opening into this has a screen. The tanks used will hold 130 gal. when filled up to the overflow pipe.

In order that the various parts may be kept together and assembled in the proper compressor each is numbered with red paint as it is removed from the rinsing tank.

Light-Weight, Double-Burner Preheater

THE Metal & Thermit Corporation has perfected a new light-weight double-burner rail preheater for thermit rail welding which is particularly designed to expedite work where the two burners can be used for preheating two joints simultaneously.



Light-Weight Double-Burner Preheater

The new double-burner preheater has been thoroughly tested and has proved to be of as high efficiency as the single-burner preheater, which will continue to be supplied for use in cases where the double-burner preheater is not feasible, such as where the joints to be welded are scattered. The capacity of the blower and gasoline tank of the new double-burner preheater is double that of the single-burner preheater, and the new preheater is equipped with two heating coils instead of one, also with two 25-ft. lengths of hose.

Obtaining Best Results from Preheaters

THE Metal & Thermit Corporation, which has recently been conducting some extensive experiments with different types of burners to be used in connection with its standard thermit preheaters, found that the best results were secured with a burner pipe ⅜ in. in diameter, swaged down at one end and then drilled with a $\frac{7}{16}$-in. hole. Such a burner pipe fully atomizes the fuel before it enters the mold and gives the best combustion. It was found that when larger burners were used, or when ends had not been swaged down, considerable air and fuel was wasted. The fuel does not become fully atomized, with the result that raw oil is carried into the mold or is wasted by dripping from the end of the pipe. A proper nozzle as described can be easily made.

Tin Superior to Solder for Fastening Wires

SOLDER has been replaced by tin in the shops of the Municipal Railway at San Francisco as a means for holding together the wires used in banding armatures. This change has been made to take advantage of the superior bonding quality developed by molten tin in contact with tinned steel and copper. Copper strips are placed around the armature as bands on which to wind the steel wires and the tin is applied with a soldering iron just as in the ordinary use of solder.

Keeping Down Oil Consumption

IN THE shops of the Eastern Massachusetts Street Railway at Fall River the local master mechanic, J. J. Curley, has his oilers divided into crews, each of which is supposed to do its work as if it were operating a small carhouse of its own. Each crew has its own packing can in the oil house with its own waste soaking and draining outfit. Each is allowed a certain amount of oil per month and is expected to get along within

this allowance. Each man is furnished with a 5-gal. can with a padlock so no one else uses his oil.

Smoothing Off Rebabbitted Bearings

THE old method of trimming up the edges of "windows" in rebabbitted bearings for the journal boxes of street cars has been discarded in the shops of the Municipal Railway at San Francisco in favor of the oxyacetylene torch. The torch flame is simply run around the edges of the windows, removing surplus metal and leaving a smooth edge.

Utilizing Out-of-Doors in Pipe Cutting

IN THE Fall River shops of the Eastern Massachusetts Street Railway a pipe vise is mounted on a bench close to an outside wall. A hole has been made in the wall and covered with a slide, to permit the end of a pipe to be threaded or cut without having the entire length of the pipe in the room, the pipe being pushed out through the hole to get rid of it. For use where quarters are close this plan appears to have merit and it certainly has proved to be convenient.

Closing Up Spread Armature Core Laminations

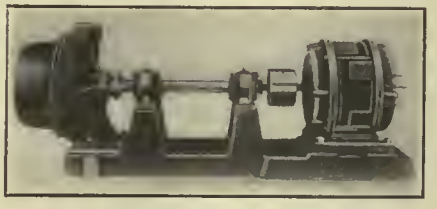
IN REPAIRING railway motor armatures, the laminations are sometimes found to be bent at the end of the armature core to such an extent that the coils used for rewinding will not fit. Also in the ventilated core type of armature the laminations become bent adjacent to the ventilating slots, sometimes to such an extent that the slots are entirely closed at the top. Where armatures are found in this condition it is quite necessary that the laminations be bent back into place. In doing this, if the laminations are struck on the end without some sort of support a little farther on, the bending is only transmitted to another part.

In order to take care of this condition, the New York & Queens County Railway has made some special tools which it uses in its Woodside shop armature room. To hold the laminations at the ventilating slot and also to bend these back in position a wedge-shaped tool with a slot in the wedge portion is used. This is driven into the ventilating core opening, the slotted part of the tool being of sufficient size to fit over the through portion of the slot. With the tools inserted in the ventilating core, the end laminations can be bent back without danger of shifting other laminations. A tool has been made which fits over the end bell of the armature and has a flat end to rest against the end lamination. This can be driven with a mallet without danger of its tipping up due to the blows, and thus the laminations can be bent back into position. Sometimes where laminations rub the pole faces badly they become distorted to as much as ½ inch.

New Equipment Available

New Ball-Bearing, Self-Priming Pump

THE Fulflo Specialties Company, Blanchester, Ohio, has added to its line of pumps the 75-gal., ball-bearing, motor-driven pump shown in the accompanying illustration. The



Motor-Driven, Impeller Pump of the "Fulflo" Type

manufacturers have given special attention to the self-priming and anti-clog features of these pumps and to their free-floating impellers. The construction is such that a steady flow of liquid is assured, whether the demand be small or great.

New Device Signals Rear Traffic

THE tremendous increase in automobile traffic has created new types of accidents in the form of damages to street cars from rear-end collisions and injuries to alighting passengers from automobiles failing to stop with the car.

An indicating stop signal system has been developed exclusively for street railway service, arranged so that with the first act of the motorman to stop the car by air-brake application, a signal light located on the rear dash signals the act to the rear traffic.

The signal is in the form of an inclosed electric lamp, one side of the box being fitted with a red cross-ribbed glass and the word "stop" ground into it, somewhat on the order of the popular stop lamp signal now used with such great success by motorists. The box is of such size that large distinct letters are used enabling the rear traffic to see the signal from considerable distance.

The signal control is tied in with the vestibule doors in such a manner that the signal lamp will remain lighted until all doors are fully closed and the air brakes released. This is accomplished by the use of door switches which make contact when the doors are opened.

The signal is controlled by application to the air brakes through a pneumatically operated switch arranged so that the switch contacts are closed with the first few pounds of air pressure applied to the brake system. The standard electric railway 23-watt lamp is used, eliminating the necessity of a new size in lamps.

On cars of the one-man safety type, where the doors are interlocked with the air brakes so that they cannot be opened until the brakes are applied, the door switches are not required.

This device is manufactured and sold by the Oskel Equipment Company, McCormick Building, Chicago.

Duplex Tape Saves Time

A COMBINATION tape, serving the purpose of both rubber and friction tapes, is now being made by the Diamond Holdfast Rubber Company. One side of the tape is a high-grade rubber compound, red in color, and the reverse side is fabric (friction tape) impregnated with adhesive and insulating mixtures. The friction side of the tape is black. Two advantages are claimed for this duplex tape: first, that the time saved by doing in one operation what is usually done in two, much more than counterbalances a higher initial cost; and second, that the presence of the two elements in one tape insures that any joint which is taped at all will be taped with both materials.

The News of the Industry

$25,000,000 Project Proposed

Plans for Subway System for Lines of Pacific Electric Railway in Los Angeles

The Los Angeles Planning Commission has just filed its plans with the Los Angeles Board of Public Utilities for a subway system for the cars of the Pacific Electric Railway that operate in congested streets. The railway company has favorably received the plans. The construction of the lines embraced in the project would represent an expenditure of $20,500,000. The proposed system of subways includes the provision of an underground terminal beneath the city's central park known as Pershing Square. The plans have also been approved by the Community Development Association of Los Angeles.

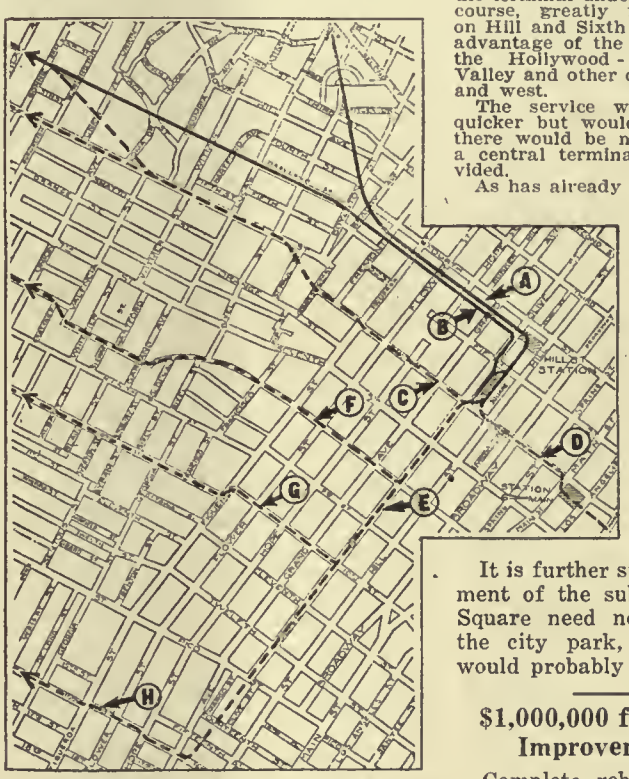
It is understood that the report of the City Board of Public Utilities to the City Council on transportation matters in Los Angeles will recommend that the Pacific Electric and the Los Angeles Railway lines be awarded the franchises asked by them to operate motor bus "feeder" lines to serve throughout the entire city; that the two railways arrange to establish a system of intercompany transfers, and that the Pacific Electric lines provide the necessary subway system whereby it would remove all of the interurban electric trains from the city's streets.

There will be no definite recommendation by the board, it is said, with respect to the application of the People's Motor Bus Company, which is fostered by the McAdoo interests, for franchise rights on 60 miles of the city's streets. The board's proposal in this matter is left to the decision of the people at the election on May 1. One of the initiative measures is designed to open up the congested district of the city to the operation of jitneys and motor buses. The other measure calls for a straw vote on the question whether the City Council shall advertise for sale a twenty-one-year franchise such as petitioned for by the People's Motorbus Company for the operation of a motorbus system in Los Angeles.

The huge system of subways has also been approved by the Los Angeles Traffic Commission.

The Pacific Electric Railway has plans already prepared for the construction, at a cost of $3,000,000, of its proposed Hollywood rapid transit subway, the terminal in Los Angeles being proposed at the company's present Hill Street terminal located between Fourth and Fifth Streets on Hill Street.

The City Planning Commission suggests that the present plan be abandoned of making the Pacific Electric Railway terminal on Hill Street between Fourth and Fifth Streets the terminal of the Hollywood subway, on which it was proposed to begin work shortly, and that, instead, Pershing Square, located on Hill Street between Fifth and Sixth Streets, be made the site of the terminal. The cost of the Hill Street-Hollywood subway project is estimated at $3,000,000, whereas the Pershing Square plan would cost $4,500,000 to carry out. Located four blocks east of Pershing Square is the present main interurban terminal of the Pacific Electric Railway at Sixth and Main Streets. The plan would be to connect this with the Pershing Square terminal.



Map of Downtown Transit Area

A—Glendale-Hollywood-San Fernando tunnel. B——Original P. E. Santa Monica Bay subway right of way. C—Possible extension along and under Sixth Street, west. D—Possible extension to P. E. Station at Sixth and Main Streets. E—Possible extension along and under Olive Street. F—Possible extension along and under Eighth Street. G—Possible extension along and under Tenth Street. H—Possible extension along and under Sixteenth Street. C, F, G and H are to serve western Los Angeles and Santa Monica Bay districts.

D. W. Pontius, vice-president and general manager of the Pacific Electric lines, in commenting on the plans of the City Planning Commission of Los Angeles, stated, in part:

> If instead the Hill Street surface terminal is used then it cannot subsequently be changed because of the difference in grades and in the end the subway system serving the city would be disconnected. There would be a further advantage in the location and the available space. Am informed that the city is in position to grant franchise for subway surface rights.

From the Pacific Electric viewpoint the serious problem is presented of expending probably $1,500,000 more, since subsurface terminals are expensive. The expenditure could be justified only in the hope that it might fit into the future plans, beneficial alike to the city and to the railway. It could not be justified on the basis of any increased volume of business in connection with the construction now authorized. We recognize fully though the force of the City Planning Commission's idea with respect to the future and for that reason will make effort at once to secure the necessary money if this project is officially approved.

The subways immediately to be built with the terminal under Pershing Square will, of course, greatly relieve traffic congestion on Hill and Sixth Streets, to the very great advantage of the city and to the people in the Hollywood - Glendale - San Fernando Valley and other districts lying to the north and west.

The service would not only be much quicker but would be made regular, since there would be no street interference and a central terminal location would be provided.

As has already been announced, the work on the subway with the old location of the terminal at Hill Street has been authorized and the right-of-way has been substantially all purchased and we are now ready to let contracts in accord with the agreement with the Railroad Commission, to furnish improved service to Hollywood, Glendale and other districts concerned. Therefore a prompt decision should be reached in connection with the City Planning Commission's project in order that relief may be had at the earliest possible moment.

It is further stated that the establishment of the subway beneath Pershing Square need not ruin the beauty of the city park, but on the contrary would probably improve it.

$1,000,000 for Extensions and Improvements in Toledo

Complete rebuilding of the railway system at Toledo is contemplated in the studies now being made. It will be recalled that under the Milner service-at-cost ordinance the Doherty interests are required to furnish $1,000,000 of new capital for extensions, crosstown line, and betterments within a period of two and one-half years from the granting of the ordinance. The time limit for the new work and new capital will be up July 1.

Commissioner Wilfred E. Cann has informed Council that his organization was busy mapping out some of the changes necessary to be made and in securing data for the use of engineers working on the problem.

E. O. Mills has begun the study of the railway for the purpose of arranging an ideal system to handle the business and traffic. His idea is to coordinate the railway system with the general zoning plan, development of railroad terminals, grade crossing eliminations, and other angles of the city plan. The crosstown line, which has been a demand for several years, will probably be worked out in this study.

Commissioner Cann had contemplated the use of motor buses on several of the extended lines or in crosstown service provided their operation on lines now authorized furnished data to insure their successful use.

A new loop for interurbans entering the downtown district would also give them access to the Interurban Station with only a small portion of their runs over existing lines used by city cars and with a much shorter distance to travel in the congested district. This plan has the approval of all sides and is awaiting financing to carry it out. Interurbans may be asked to help in the financing of the new track construction due to the fact that it will mean a large saving to them in trackage rentals annually. Within the loop is also contained the present interurban freight station.

Killed by Ridicule

A bill in the Missouri Legislature requiring the United Railways, St. Louis, to equip its cars with stoplights was fought by the receiver's attorneys until finally it was loaded down with absurd amendments and then killed by ridicule.

The bill as amended provided that the law should not be operative except during total eclipses of the sun and moon.

When Senator Kinney called up the bill Senator Irwin offered an amendment which provided that every driver of a street car should be required to keep a copy of Senate Bill 124 (the anti-bootlegging bill) conspicuously posted in each and every car while standing still and in operation.

Senator Kinney said the amendment did not appear to be germane, but it was adopted, only Kinney dissenting. This resulted in much merriment. When quiet was restored, Senator Painter sent up an amendment which provided that the conductor should have additional wire and when the car stopped he should go back 400 ft. and post a light that bore the word "stop." He should carry a pole on which a light should be posted.

"I am afraid that amendment will weaken this bill," said Senator Kinney, laughing. "I hope the Senate will defeat it." The amendment won unanimously.

"Another amendment, Mr. President," said Irwin. That amendment made the bill applicable to all vehicles and wheelbarrows when in operation on the public highways. That was adopted.

Senator Proctor then offered an amendment which provided that the law be only in effect during total eclipses of the sun and moon. "Now that the bill has been perfected," said Senator Kinney, "I move that it be put upon its final passage." "How about the title?" inquired Proctor. "The House can amend the title," said Kinney. It passed with only two dissenting votes.

The bill as originally drafted applied to St. Louis and Kansas City. It passed the House in that form. The Senate committee reported it favorably with an amendment making it applicable only to St. Louis. In the Senate it was laughed to death.

Railway Relieved from Paving Requirements

At a special municipal election held in Santa Cruz, Calif., on Feb. 28 to vote on a charter amendment that would relieve the Union Traction Company from the necessity of paving between the rails and for 2 ft. outside the tracks, the amendment carried by 143 votes; the total number of votes cast was 2,445.

There was no organized effort on the part of the proponents to carry the election, their activity being confined to sending out a circular prepared by a citizens' committee explaining the facts of the case. This circular was a four-page leaflet containing questions and answers. The situation was put very forcibly by four of these answers, which were as follows:

Q. It has been stated that the street-car company carries a certain amount of watered stock. Could not the dividends paid on this stock be used for street paving purposes?

A. There has never been a dividend paid on any of the stock of the Union Traction Company, watered or unwatered. None of this stock has any value and any person desiring to own it may secure title to it without cost.

Q. Would it not be possible to reduce the amount being paid as interest on borrowed money, thus securing means to pay for cost of street paving?

A. No interest has been paid by the company for six years and no money has been available for that purpose. As a result of this the bonds of the company can be bought at 10 cents on the dollar, or less.

Q. Why should the city not acquire the street car system and pay for street paving out of the earnings?

A. If the people desire to try this experiment the company stands ready to transfer the property to the city without charge.

Q. Is it possible to cut down street car expenses by reducing salaries of company officials?

A. Officials of the company receive no salaries whatever; neither is any charge made for office rent or clerical service. Investigation by a committee of citizens disclosed that only car men, shop men and track men are on the payroll.

$9,000,000 to Be Spent for Improvements

The officials and directors of the Terre Haute, Indianapolis & Eastern Traction Company of Indiana have approved plans calling for an expenditure of nearly $9,000,000. The program as outlined by Robert I. Todd, president, calls for the following:

Construction of super-power plant, $6,000,000.

Seven substations, estimated cost $750,000.

Power transmission lines, $1,000,000.

Company's part of freight interurban development, $333,000.

Total for Terre Haute, Indianapolis & Eastern, $8,083,000.

Indianapolis Street Railway, new rolling stock, $500,000.

Mr. Todd hopes to see most of the program put through this year. However, the outcome so far as the construction of the power station here depends on the suit filed in Indianapolis to determine the right of the Indiana Public Service Commission to issue an order of convenience permitting the company to enter this field with a new power plant. The order issued by the commission does not limit the T. H., I. & E. to supplying power for itself. It is being attacked by the Indianapolis Light, Heat & Power Company and the Merchants Heat & Light Company, which have plants at Indianapolis, Ind., and insist that they are able to take care of the city's needs of power.

In a statement which he made Mr. Todd said:

There are just two factors which are confronting us in our effort to solve present power transmission and street railway problems. They are, more power, and next, more equipment—rolling stock—and our entire development program scheduled for the present year revolves about those two. In order to remedy the power situation, we have plans and have made arrangements to construct a super-power plant at our West Tenth Street station, costing approximately $6,000,000.

More electric power is imperative for the solution of our railway traffic problem, and to that end, we have planned to erect six or seven substations at various points throughout the city. The next step will be the purchase of more rolling stock, and the year's plans call for the purchase of fifty new cars for the Indianapolis Street Railway.

However, much of this development work is contingent upon the litigation in the local court. We expect when that is out of the way to begin immediately upon the year's construction program. It is one of the most extensive developments ever attempted by the company. I, of course, would rather have said "we did" than "we are going to do," but I am telling you the scope of our plans for this year.

A special judge has been appointed to try the case immediately.

San Diego Employees Receive Pay Increase

An increase of pay to its platform men which will cost the San Diego (Calif.) Electric Railway about $40,000 a year more than the old schedule was announced by Claus Spreckels, general manager, at a meeting of the company's employees March 15. The new schedule became effective March 16 and will mean an increase of from 5 to 10 cents an hour for the men. The wage increase was a complete surprise to the men, and, along with other plans of the company, was announced by Manager Spreckels as a part of his aim to make San Diego's the "best street car system in the United States."

The new wage scale of the company ranges from 40 cents an hour for beginners to 55 cents an hour as top pay, with possible bonuses that bring the top pay to 65.5 cents, and 4 cents an hour is added all the way through for one-man car operators.

The new schedule of pay is as follows:

TWO-MAN CAR OPERATORS

	New Rate	New Rate with Estimated Bonus
First three months	40.0	50.5
Next three months	41.5	52.0
Next six months	43.0	53.5
Second year	45.0	55.5
Third year	46.0	56.5
Fourth year	47.0	57.5
Fifth to ninth year	48.0	58.5
Tenth to fourteenth year	49.0	59.5
Fifteenth to nineteenth year	50.0	60.5
Twentieth to twenty-fourth year	52.5	63.0
Twenty-fifth year and after	55.0	65.5

Estimated amounts included in the bonus:

Ticket commissions	$3.50
Accident fund	3.00
Monthly bonus	2.00
Welfare service	2.00
Total	$10.50

Columbus Award Sustained, but Reduced Slightly

The Court of Appeals of Ohio in the case of the Columbus Railway, Power & Light Company, Columbus, Ohio, against E. W. Clark & Company and the individual members of that company has rendered a judgment for $799,017, which with interest of $337,292 computed to April 1 makes a total amount of $1,136,310. This is a smaller amount than was awarded by the lower court mainly due to the fact that the management contract was not made until the year 1912. Under the decision of the Court of Common Pleas the principal award was $1,079,726 with interest of $432,294 to April 1, making $1,512,-021 as against the Court of Appeal's principal, including interest, $1,136,310, or a net difference of $375,711.

On Jan. 21, 1922, Judge Kinkead of the Franklin County Common Pleas Court rendered a judgment of $1,079,726 in favor of the local Columbus Company against E. W. Clark & Company, former operating managers at Columbus, in the so-called Slaymaker suit. A list of the items in the judgment was published in the ELECTRIC RAILWAY JOURNAL for Jan. 28, page 168.

Arbitration to Be Discussed in New York

The week of May 7-12 will be "Arbitration Educational Week." In that seven-day period commercial associations and trade organizations in New York City and State will unite in an intensive effort to make known to all citizens the benefits to be derived by making use of arbitration in the settlement of business differences and disputes.

An endeavor will be put forth in this week of may to let people know that within their reach there is a simple and direct, a prompt and inexpensive way of deciding controversies and of avoiding the costly, harassing and tedious processes of litigation.

The announcement of this "educational drive for arbitration" was made at a dinner given by the Arbitration Society of America to some 400 representatives of trades, industries and commercial and professional organizations at the Hotel Pennsylvania, New York City, the evening of March 14.

All who are interested in the movement for the week's educational course in arbitration are requested to communicate with temporary headquarters of the committee which have been established in Room 906, 115 Broadway, where information as to the plan for "Arbitration Educational Week" will be gladly given.

New Plant Ready in August

The City Light & Traction Company's new plant at Sedalia, Mo., in course of erection by the Henry L. Doherty interests of New York City, will probably be ready for operation by August. The plant will have a capacity of 8,000 kw. It will cost about $350,000 fully equipped. It is the aim of the company to have the plant finished in time for the annual Missouri State Fair in August. A combination of coal and oil settings is being installed so that either fuel can be used. The smokestack will have a diameter of 20 ft., setting on a block of concrete, which will be 40 ft. in diameter and 9 ft. deep.

Passage of Bill Permits Railway to Enter Cincinnati

The first step toward the entrance of the Cincinnati, Lawrenceburg & Aurora Electric Street Railroad into the heart of the Cincinnati business district on an elevated structure was taken on March 9, when the House of Representatives at Columbus, unanimously passed the bill of Representative Samuel Lipp of Cincinnati carrying the necessary legislation. The bill repeals an old law which limited the fare to be charged on elevated railways within city limits to 5 cents and substitutes a provision that the rate of fare shall be agreed upon between the City Council and the interurban company. The proposed elevated structure will extend the interurban line from its present terminus at Anderson's Ferry to the Dixie Terminal.

Arrangements were completed more than a year ago to extend the interurban road so as to bring its cars into the Dixie Terminal on elevated tracks from Sixth Street and State Avenue. When it was found that the Schmidlapp law provided that only a 5-cent fare could be charged the project was abandoned for the time being because it could not be financed on that basis. The Cincinnati, Lawrenceburg & Aurora Electric Street Railroad will use the right-of-way of the Big Four Railroad from Anderson's Ferry to Sixth Street and State Avenue. The railroad has agreed to lease part of its property to the interurban company for that purpose. The extension would cost $750,000.

Looks to Electrification.—P. H. Nee, superintendent of the Wisconsin Valley division of the Chicago, Milwaukee & St. Paul Railway, stated in Merrill recently that he looked forward to the eventual electrification of the Wisconsin Valley system of the road with overhead lines.

Reports No Accidents.—The City Light & Traction Company at Sedalia, Mo., on March 16, announced that not a single accident had been reported since Jan. 1. This is declared to have been the longest period of time ever passed that some employee of the traction had not incurred a personal injury of some sort.

Seeks Restoration of Service.—Assemblyman Dunne has introduced a bill in the New York State Legislature directing the Brooklyn Heights (N. Y.) Railroad, or such person as may be in control of the same, to restore service on the Tompkins-Culver line, in the Borough of Brooklyn, State of New York, for a fare not exceeding 5 cents.

Classes for Supervisors Formed.—Regular classes for supervisors have been started by the Los Angeles (Calif.) Railway, to keep them informed on recent matters affecting transportation. The meetings are held every Friday in the instruction department lecture room. Subjects are announced for one week ahead and certain supervisors are instructed to prepare to lead the discussion.

Opposed to Germantown Branch.—In a report to the City Council Transit Director Twining of Philadelphia, Pa., opposed the construction of a high-speed branch of the Broad Street subway to Germantown and Chestnut Hill. He said he believed that the proposed electrification of the Philadelphia & Reading Railway branch to Germantown would take care of the transportation needs of that section.

Commission Requires Data Filed.—In line with its policy of keeping a close account of the affairs of all public utilities corporations in order that the public interest may be thoroughly safeguarded, the California Railroad Commission recently adopted a resolution requiring public utilities to file salary data and an accounting of donations, contributions, subscriptions and cash balances.

Employees Have Chance to Win Money.—The British Columbia Electric Railway, Vancouver, B. C., will offer a prize of $5 each month to the best article on the prevention of street car accidents. The contest is open to any employee not on the office payrolls. According to the rules of the contest articles must be turned in on or before the twentieth of the month and should not be more than 500 words long.

Re-Elect Employees Representative.—Employees of the Louisville (Ky.) Railway, were so well pleased with the work of Daniel L. Kehl, representative of the Welfare Association of Employees on the board of directors of the company, that they re-elected him as employees' representative at the annual election on Feb. 15. Mr. Kehl is a clerk in the maintenance of way department. The practice of having an employee on the board was started in 1922, and has become a part of the regular method of handling the affairs of the company.

J. N. Clark Heads Pacific Railway Club.—The Pacific Railway Club, at its meeting in Berkeley, Calif., on March 8, listened to an address by George M. Basford, consulting engineer, Lima Locomotive Works, Inc., on the subject "As to the Locomotive, What Next?" New officers for the year were elected as follows: President, J. N. Clark, chief fuel supervisor Southern Pacific Company; first vice-president, J. M. Yount, master mechanic Market Street Railway; second vice-president, H. A. Mitchell, vice-president and general manager San Francisco-Sacramento Railroad; treasurer, R. G. Harmon, chief clerk city freight department, Western Pacific Railroad.

Financial and Corporate

$15,103 Behind Return

Grand Rapids Year Better, but Company Ran Behind Return Allowed Under New Grant

For the first time in several years the Grand Rapids (Mich.) Railway in 1922 earned a small surplus over charges. This surplus was only $6,583, but it compares with a deficit of $30,481 in 1921, and a deficit of $147,070 in 1920. Since 1920 the ratio of operating expenses to gross earnings has been gradually reduced from 74.17 per cent in 1920 to 66.33 per cent in 1921, and to 65.29 per cent in 1922. Likewise the ratio of operating expenses and taxes to gross earnings has been decreased from 81.27 per cent in 1920 to 73.51 per cent in 1921 and then to 72.41 per cent in 1922.

It will be recalled that a new franchise was passed by the City Commission of Grand Rapids on June 12, 1922, and was accepted by the company subject to the approval of the electors of the city. At an election held Sept. 12 the franchise was submitted to the people and approved by approximately 72 per cent of the voters. The franchise was immediately put into effect. It is of the service-at-cost type, based on an initial valuation of the property for rate making purposes of $5,500,000, plus the cost of additions made from time to time, the rate of return depending upon the rate of fare charged. The initial rate of return was fixed at 8 per cent with the same fare as was in effect during the greater part of 1922, namely, 10 cents cash or seven tickets for 50 cents, transfers free.

L. J. DeLamarter, vice-president and general manager of the company, explained in the report of the company that from Sept. 1, 1922, the date as of which the franchise became effective, to Dec. 1, 1922, the company failed by the amount of $15,103 to earn the return to which it was entitled. He says that more favorable results are expected in 1923, however, as the management hopes to effect further operating economies without any curtailment of the service rendered to the public.

Capital expenditures during the year were devoted principally to the betterment of the company's existing facilities. They amounted to $207,840. Against this sum there was a credit of $102,136 representing the cost of property retired from service, making the net addition $105,704. Seventeen cars were remodeled into equipment of more modern type and fitted with standard safety car devices, so that they may be operated as one-man cars. It is planned to remodel twenty-eight more cars in a similar manner during 1923 and to purchase eight new cars of this type. It is also proposed, according to Mr. DeLamarter, to purchase six modern motor buses to provide service in some parts of the city not now supplied with railway facilities and for use in other sections when the streets are placed in good condition.

SERVICE RENDERED

Total number of passengers carried annually by the Grand Rapids Railway for the past five years:

	Revenue Passengers	Transfer Passengers	Total Passengers
1922.....	24,058,780	6,191,023	30,249,803
1921.....	24,437,134	6,250,583	30,687,717
1920.....	27,813,220	6,627,889	34,441,109
1919.....	26,307,032	6,474,666	32,781,698
1918.....	24,884,739	5,990,443	30,875,182

Mr. DeLamarter reports that business conditions in Grand Rapids showed further improvement during 1922 and that a recent survey of the industrial situation indicates that the various local manufacturers will operate their plants at capacity throughout 1923. He says that there is every indication that Grand Rapids will enjoy a continuation of progress and prosperity during the coming year and that the effect of this increased activity should be reflected in the company's operating results for the coming year.

Statement of earnings of the Grand Rapids Railway for the year ended Dec. 31, 1922, together with comparative statement of income and expenses for the two preceding years.

	1922	1921	1920
Gross earnings:			
Passenger revenue—city lines	$1,813,246	$1,795,634	$1,740,952
Revenue from special cars, etc.	1,171	1,092	3,992
Rent of equipment, tracks, etc.	43,223	47,584	57,987
Non-operating revenue	3,836	421	1,362
Total	$1,861,476	$1,844,731	$1,804,293
Operating expenses, taxes and depreciation:			
Operating expenses	$1,215,522	$1,223,779	$1,338,312
Taxes	132,403	132,244	128,052
Depreciation	176,131	181,323	150,000
Total	$1,524,056	$1,537,346	$1,616,364
Gross income	$337,420	$307,385	187,928
Interest and other fixed charges	330,836	337,867	334,998
Net income	$6,584	$*30,484	$*147,070
* Deficit			
Ratio of operating expenses to gross earnings	65.29%	66.33%	74.17%
Ratio of operating expenses and taxes to gross earnings	72.41%	73.51%	81.27%

I.T.S. Stockholders Approved Merger Plan

At an adjourned meeting of the stockholders of the Illinois Traction Company, Peoria, Ill., held in Portland, Me., the plan was approved for consolidating the Southern Illinois properties controlled by Clement Studebaker, Jr., and his associates, with those of the Illinois Traction Company. The plan will be carried out in accordance with terms outlined in the ELECTRIC RAILWAY JOURNAL for March 10, page 424.

New Directors Elected

At the annual meeting of the stockholders of the Philadelphia (Pa.) Rapid Transit Company held on March 21 a resolution was passed providing that a co-operative wage dividend of 10 per cent of the annual wage for 1923 be paid employees after the payment of the usual 6 per cent dividend had been made to stockholders.

Three new members were elected to the board of directors. They are Leon Jewell, vice-president in charge of traffic; W. K. Myers, acting vice-president, and R. R. Nyman, who, as president of the Co-operative Welfare Association, represents the employees.

The first two men replace Nelson Robinson and H. G. Tulley. Mr. Nyman, who is a motorman on the Lombard and South Streets line, replaces John E. McElroy, a foreman, who is the past-president of the Co-operative Association.

Other changes in organization were referred to in the ELECTRIC RAILWAY JOURNAL, issue of Feb. 24.

Net Income Up 63 per Cent

Summary Presented of Reports of 225 Companies—Outlook for Industry Very Promising

Edmund J. Murphy, chief statistician of the American Electric Railway Association, writing in A.E.R.A. for April, 1923, says that reports from electric railways for the year 1922 show that at the present time the electric railways are in a stronger position financially than they have been at any time since 1917. The operating ratio is down to 72.6 per cent and the net income after the payment of all expenses, taxes and fixed charges has increased more than 60 per cent over the figure for 1921. The 1921 net was 186 per cent greater than that of 1920. In 1922, the interurban lines came back strongly.

The summary of the trend of railway operations in 1922 is based on reports of 225 companies. Their combined figures are shown in the accompanying tables together with certain traffic ratios calculated from the figures on a comparable basis. The 225 companies operate 21,484 miles of single track, of which 13,679 miles are city track and 7,805 miles interurban track. The city track is about half the total in the country and the interurban track about 43 per cent of all interurban track. The combined railway revenues of these companies amount to about one-half of the total railway earnings of the industry.

The tables show that the net income of these companies increased from $22,852,418 in 1921 to $37,237,680 in 1922, or 63 per cent. The operating ratio of the combined groups dropped from 75.54 per cent to 72.66 per cent.

TABLE I—COMBINED INCOME STATEMENT OF 225 URBAN AND INTERURBAN RAILWAYS FOR 1922 COMPARED WITH 1921

	1922	1921	Increase	Per Cent Increase
Railway operating revenue..	$464,365,210	$469,548,024	*$5,182,814*	*1.10*
Railway operating expenses.	337,419,485	354,738,718	*17,319,233*	*4.88*
Net operating revenue....	$126,945,725	$114,809,306	12,136,419	10.57
Net revenue auxiliary operations	20,709,359	18,631,987	2,077,372	11.14
Taxes	33,622,064	32,347,991	1,274,073	3.94
Operating income	$114,033,020	$101,093,302	12,939,718	12.80
Non-operating income	9,203,921	8,444,185	759,736	9.00
Gross income	$123,236,941	$109,537,487	13,699,454	12.51
Income deductions	85,999,261	86,685,069	*685,808*	*0.79*
Net income	$37,237,680	$22,852,418	14,385,262	62.95
Operating ratio (per cent)	72.66	75.54	*2.88*	*3.81*
Ratio: net income to operating revenue (per cent)	8.02	4.87	3.15	64.68

Note—*Italics* denote decrease.

TABLE II—COMBINED INCOME STATEMENT OF 121 URBAN RAILWAYS FOR YEAR 1922 COMPARED WITH 1921

	1922	1921	Increase	Per Cent Increase
Railway operating revenue..	$387,244,748	$390,739,415	*$3,494,667*	*0.90*
Railway operating expenses.	277,774,741	291,631,472	*13,856,731*	*4.75*
Net operating revenue....	$109,470,007	$99,107,943	10,362,064	10.45
Net revenue auxiliary operations	14,203,448	12,770,636	1,432,812	11.22
Taxes	28,528,551	27,403,521	1,125,030	4.10
Operating income	$95,144,904	$84,475,058	10,669,846	12.63
Non-operating income	6,606,859	5,842,356	764,503	13.08
Gross income	$101,751,763	$90,317,414	11,434,349	12.66
Income reductions	69,025,224	69,390,202	*364,978*	*0.53*
Net income	$32,726,539	$20,927,212	11,799,327	56.38
Operating ratio (per cent)	71.73	74.63	*2.90*	*3.89*
Ratio: net income to operating revenue (per cent)	8.45	5.36	3.09	57.64

Note—*Italics* denote decrease.

TABLE III—COMBINED INCOME STATEMENT OF 104 INTERURBAN RAILWAYS FOR 1922 COMPARED WITH 1921

	1922	1921	Increase	Per Cent Increase
Railway operating revenue..	$77,120,462	$78,808,609	*$1,688,147*	*2.15*
Railway operating expenses.	59,644,744	63,107,246	*3,462,502*	*5.49*
Net operating revenue....	$17,475,718	$15,701,363	1,774,355	11.30
Net revenue auxiliary operations	6,505,911	5,861,351	644,560	11.00
Taxes	5,093,513	4,944,470	149,043	3.01
Operating income	$18,888,116	$16,618,244	2,269,872	13.66
Non-operating income	2,597,062	2,601,829	*4,767*	*0.18*
Gross income	$21,485,178	$19,220,073	2,265,105	11.78
Income deductions	16,974,037	17,294,867	*320,830*	*1.86*
Net income	$4,511,141	$1,925,206	2,585,935	134.32
Operating ratio (per cent)	77 34	80.08	*2.74*	*3.43*
Ratio: net income to operating revenue (per cent)	5.85	2.44	3.41	139.75

Note—*Italics* denote decrease.

TABLE IV—COMBINED STATEMENT OF OPERATING EXPENSES OF 225 URBAN AND INTERURBAN RAILWAYS FOR 1922 COMPARED WITH 1921

	1922	1921	Increase	Per Cent Increase
Way and structure	$48,888,542	$50,492,228	*$1,603,686*	*3.18*
Equipment	40,668,430	44,836,816	*4,168,386*	*9.30*
Power	51,574,563	52,161,245	*586,682*	*1.13*
Conducting transportation..	143,220,630	153,981,163	*10,760,533*	*6.99*
Traffic	1,131,400	1,009,636	121,764	12.06
General and miscellaneous..	46,269,268	46,580,538	*311,270*	*0.67*
Transportation for investment credit	*178,132*	*76,256*	101,876	133.60
Total operating expenses	*$337,419,485	†$354,737,813	*$17,318,328*	*4.88*

* Includes $5,844,784 miscellaneous expense and undistributed depreciation.
† Includes $5,752,443 miscellaneous expense and undistributed depreciation.
Note—*Italics* denote decrease.

TABLE V—COMBINED INCOME STATEMENT ON A CAR-MILE BASIS (IN CENTS) OF 121 URBAN, 104 INTERURBAN AND THE COMBINED TOTAL OF 225 URBAN AND INTERURBAN RAILWAYS FOR 1922 COMPARED WITH 1921

	121 Urban Railways			104 Interurban Railways			225 Urban & Interurban Railways		
	1922	1921	Per Cent Increase	1922	1921	Per Cent Increase	1922	1921	Per Cent Increase
Railway operating revenue	45.7	46.1	*0.9*	45.1	47.2	*4.5*	45.5	46.6	*2.4*
Railway operating expenses	32.8	34.4	*4.7*	34.9	37.8	*7.7*	33.0	35.2	*6.3*
Net operating revenue	12.9	11.7	10.3	10.2	9.4	8.5	12.5	11.4	9.7
Net revenue auxiliary operations	1.7	1.5	13.3	3.8	3.5	8.6	2.0	1.8	11.1
Taxes	3.4	3.2	6.3	3.0	3.0	....	3.3	3.2	3.1
Operating income	11.2	10.0	12.0	11.0	9.9	11.1	11.2	10.0	12.0
Non-operating income	0.8	0.7	14.3	1.5	1.6	*6.3*	0.9	0.8	12.5
Gross income	12.0	10.7	12.2	12.5	11.5	8.7	12.1	10.8	12.0
Income deductions	8.2	8.2	....	9.9	10.3	*3.9*	8.4	8.6	*2.3*
Net income	3.8	2.5	52.0	2.6	1.2	116.7	3.7	2.2	68.2

Note—*Italics* dennte decrease.

TABLE VI—COMBINED STATEMENT OF OPERATING EXPENSES OF 121 URBAN RAILWAYS FOR 1922 COMPARED WITH 1921

	1922	1921	Increase	Per Cent Increase
Way and structures	$38,538,528	$39,478,562	*$940,034*	*2.38*
Equipment	33,681,548	37,081,258	*3,399,710*	*9.17*
Power	40,769,134	41,089,374	*320,240*	*0.78*
Conducting transportation..	122,005,545	131,017,097	*9,011,552*	*6.88*
Traffic	636,656	531,214	105,442	19.85
General and miscellaneous..	36,560,251	36,857,759	*297,508*	*0.81*
Transportation for investment credit	*132,880*	*48,230*	84,650	175.51
Total operating expenses	*$277,774,741	†$291,631,472	*$13,856,731*	*4.75*

* Includes $5,715,959 miscellaneous expense and undistributed depreciation.
† Includes $5,624,438 miscellaneous expense and undistributed depreciation.
Note—*Italics* denote decrease.

TABLE VII—COMBINED STATEMENT OF OPERATING EXPENSES OF 104 INTERURBAN RAILWAYS FOR 1922 COMPARED WITH 1921

	1922	1921	Increase	Per Cent Increase
Way and structures	$10,350,014	$11,013,666	*$663,652*	*6.03*
Equipment	6,986,882	7,755,558	*768,676*	*9.92*
Power	10,805,429	11,071,871	*266,442*	*2.41*
Conducting transportation..	21,215,085	22,964,066	*1,748,981*	*7.62*
Traffic	494,744	478,422	16,322	3.41
General and miscellaneous..	9,709,017	9,722,779	*13,762*	*0.15*
Transportation for investment credit	*45,252*	*28,026*	17,226	61.40
Total operating expenses..	*$59,644,744	†$63,106,341	*3,461,597*	*5.49*

* Includes $128,825 miscellaneous expense and undistributed depreciation.
† Includes $128,005 miscellaneous expense and undistributed depreciation.
Note—*Italics* denote decrease.

TABLE VIII—COMBINED STATEMENT OF OPERATING EXPENSES ON A CAR-MILE BASIS (IN CENTS) OF 121 URBAN, 104 INTERURBAN AND A COMBINED TOTAL OF 225 URBAN AND INTERURBAN ELECTRIC RAILWAYS FOR THE CALENDAR YEAR 1922 COMPARED WITH THE CALENDAR YEAR 1921

	121 Urban Railways			104 Interurban Railways			225 Urban & Interurban Railways		
	1922	1921	Per Cent Increase	1922	1921	Per Cent Increase	1922	1921	Per Cent Increase
Way and structures	4.6	4.6	....	6.0	6.6	*9.0*	4.9	5.0	*2.0*
Equipment	4.0	4.4	*9.0*	4.1	4.7	*12.8*	3.9	4.4	*11.4*
Power	4.8	4.8	....	6.3	6.6	*4.5*	5.0	5.2	*3.9*
Conducting transportation	14.3	15.4	*7.1*	12.4	13.7	*9.5*	14.0	15.3	*8.5*
Traffic	0.08	0.06	33.3	0.3	0.3	....	0.1	0.1	....
General and miscellaneous	4.3	4.4	*2.3*	5.7	5.8	*1.7*	4.5	4.6	*2.2*
Transportation for investment credit	*0.02*	*0.006*	233.3	0.3	0.02	50.0	0.02	0.008	150.0
Total operating expenses	*32.8	†34.4	*4.7*	(*a*)34.9	(*b*)37.8	*7.7*	(*c*)33.0	(*d*)35.2	*6.3*

Note—*Italics* denote decrease.
* Includes 0.7 cent miscellaneous expense and undistributed depreciation.
† Includes 0.7 cent miscellaneous expense and undistributed depreciation.
(*a*) Includes 0.08 cent miscellaneous expense and undistributed depreciation.
(*b*) Includes 0.08 cent miscellaneous expense and undistributed depreciation.
(*c*) Includes 0.6 cent miscellaneous expense and undistributed depreciation.
(*d*) Includes 0.6 cent miscellaneous expense and undistributed depreciation.

TABLE IX—COMBINED STATEMENT OF TRAFFIC STATISTICS OF 121 URBAN, 104 INTERURBAN AND THE COMBINED TOTAL OF 225 URBAN AND INTERURBAN RAILWAYS FOR YEAR 1922 COMPARED WITH 1921

	121 Urban Railways			104 Interurban Railways			225 Interurban and Urban Railways		
	1922	1921	Per Cent Increase	1922	1921	Per Cent Increase	1922	1921	Per Cent Increase
Car-miles (revenue)	$845,734,745	$847,592,698	*0.22*	$171,178,091	$166,655,977	2.71	$1,016,912,836	$1,014,248,675	0.3
Car-hours (revenue) (*a*)	$87,859,148	$88,183,278	*0.37*	$12,312,871	$11,975,022	2.82	$100,172,019	$100,158,300	0.013
Total passengers (*b*)	7,141,465,488	7,115,513,825	0.36	664,830,692	662,025,859	*0.42*	7,806,296,180	7,777,539,684	0.37
Revenue passengers (*c*)	5,594,228,682	5,589,527,249	0.08	582,097,091	583,373,097	*0.22*	6,176,325,773	6,172,900,346	0.05
Transfer passengers	1,484,724,216	1,456,458,387	1.94	76,311,362	71,800,780	6.28	1,561,035,578	1,528,259,167	2.14
Miles of single track	13,678.9	13,667.8	0.08	7,804.7	7,697.6	1.39	21,483.6	21,365.4	0.55
Cars operated (*e*)	20,841	20,381	2.26	1,301	1,286	1.16	22,142	21,667	2.65
Passenger revenue	$377,438,473	$379,870,548	*0.64*	$64,278,476	$64,490,371	*0.33*	$441,716,949	$444,360,919	*0.59*

Note—Italics denote decrease.
(*a*) Car-hours were reported by one hundred and eighteen urban companies and eighty-two interurban companies, making a total of two hundred companies.
(*b*) Two interurban companies did not report total passengers carried.
(*c*) Two interurban companies did not report revenue passengers carried.
(*e*) Cars operated were reported by one hundred and four urban companies and seventy-four interurban companies, making a total of one hundred and seventy-eight companies.

These are the outstanding features of the year's returns. The increase in the net income amounted in actual money to $14,385,262, a most hopeful sign.

The number of passengers carried in 1922 was greater by nearly 30,000,000 than in 1921. The first half of the year the electric railways sustained heavy losses. The second half of the year found the trend in the other direction and each succeeding month showed an increased gain in the number of passengers carried. These gains more than offset the earlier losses so that the year as a whole registered a slight improvement over 1921. Thus, the actual conditions are more favorable than these figures would seem to indicate.

Although the number of passengers carried increased slightly as set forth above the receipts from railway operations fell off slightly more than 1 per cent. This was brought about by reductions in fares in 1922. For the most part these fare reductions took the form of lower rates for the frequent rider who purchases reduced rate tickets. For the whole group of 225 companies the average fare per passenger dropped from 7.2 cents in 1921 to 7.1 cents in 1922. For the city lines alone, it fell from 6.8 cents to 6.7 cents and for the interurbans it remained constant at 11 cents. As Mr. Murphy sees it this indicates very clearly that the industry is not yet in a position where it can afford to reduce its fares. Under present conditions a very small reduction in fares is immediately reflected in lower revenues.

The total operating expenses for the whole group fell from $354,738,718 in 1921 to $337,419,485 in 1922, a decrease of $17,319,233, or 4.88 per cent. The city lines showed a decrease of 4.75 per cent and the interurban 5.49 per cent. This, of course, is the main reason for the improved condition of the electric railways. Conducting transportation, which is made up principally of trainmen's wages, decreased 7 per cent, representing a saving of $10,760,533.

Mr. Murphy says it would seem that the industry will have to look to increased traffic to further improve its position in 1923 rather than to a continued decline in the cost of operation.

Earnings Statement Presented at Buffalo Meeting

Thomas E. Mitten was re-elected chairman of the board of directors of the International Railway, Buffalo, at the annual meeting of stockholders. The entire capital stock of the company, consisting of 167,075 shares, was voted supporting the work of Mitten Management, Inc., during the strike of 1922 and for its continuance in conformity with its contract covering the operation of the local and interurban lines of the International.

Coleman J. Joyce, was re-elected vice-chairman and counsel. Other officers elected were: Herbert G. Tulley, president; Thomas Penney, general counsel; R. Harland Horton, vice-president in charge of traffic; H. L. Mack, vice-president in charge of engineering; F. T. Nelson, comptroller; C. A. Webber, secretary-treasurer and C. A. Chavel, auditor. Those on the executive committee are Messrs. Mitten, Joyce and Tulley.

The following directors were elected: Thomas E. Mitten, Dr. Henry C. Buswell, John J. Clawson, Walter P. Cooke, W. C. Dunbar, Coleman J. Joyce, R. Harland Horton, Charles R. Huntley, H. L. Mack, Thomas Penney, Harry T. Ramsdell, Nelson Robinson, Carlton M. Smith, Herbert G. Tulley, C. A. Weber, Harry Yates and Henry C. Zeller.

Passenger revenue for the six months ended Dec. 31, 1922, was $1,995,733 and for the year ended June 30, 1922, was $10,248,361. The cost of conducting transportation in the last six months of the year (during the period of the strike) was nearly two-thirds as much as for the previous full year.

Conducting transportation cost $2,085,433 in the six strike months, as compared with $3,440,020 in the previous full year. Gross operating income for the full year ending June 30, 1922, was $1,596,604 as compared with an operating deficit of $3,396,226 in the six months beginning with July 1, 1922, the day the strike started. After payment of all charges, including interest, rentals, taxes, etc., the company had a net income of $284,893 in the full year ending with June 30, 1922, but the six months' operation during the strike resulted in a net deficit of $4,107,514. The balance sheets lists this "unamortized strike suspense" of $4,107,514 as an asset. Other items are $44,000,-

TABLE X—SOME SIGNIFICANT RATIOS DERIVED FROM THE FIGURES SHOWN IN TABLES I TO IX.

	121 Urban Railways			104 Interurban Railways			225 Urban and Interurban Railways		
	1922	1921	Per Cent Increase	1922	1921	Per Cent Increase	1922	1921	Per Cent Increase
Railway operating revenue	$387,244,748	$390,739,415	*0.90*	$77,120,462	$78,808,609	*2.15*	$464,365,210	$469,548,024	*1.10*
Per mile of single track	28,310	28,588	*0.97*	9,881	10,238	*3.49*	21,614	21,977	*1.66*
Passenger revenue	$377,438,473	$379,870,548	*0.64*	$64,278,476	$64,490,371	*0.33*	$441,716,949	$444,360,919	*0.59*
Per revenue passenger, cents	6.7	6.8	1.47	(*c*)11.0	(*c*) 11.0	....	7.1	7.2	*1.39*
Per total passengers, cents	5.3	5.3	....	(*c*) 9.6	(*c*) 9.7	*1.04*	5.6	5.7	*1.75*
Per mile of single track	$27,593	$27,793	*0.72*	$8,236	$8,378	*1.69*	$20,561	$20,798	*1.14*
Per car-mile, cents	44.6	44.8	*0.45*	37.6	38.6	*2.59*	43.4	44.0	*1.36*
Per car operated	(*a*)$16,587	(*a*)$17,046	*2.69*	(*f*)$24,759	(*f*)$24,134	*2.60*	(*m*)$17,068	(*m*)$17,467	*2.28*
Per car-hour	(*b*)$4.10	(*b*)$4.10	....	(*g*)$4.49	(*g*)$4.55	*1.32*	(*k*)$4.14	(*k*)$4.16	*0.48*
Revenue passengers	5,594,228,682	5,589,527,249	0.08	(*e*)582,097,091	(*e*)583,373,097	*0.22*	(*l*)6,176,325,773	(*l*)6,172,900,346	0.05
Per mile of single track	408,968	408,955	....	(*e*)75,140	(*e*)76,361	*1.59*	(*l*)288,267	(*l*)289,706	*0.50*
Per car-mile	6.6	6.6	....	(*e*)3.4	(*e*)3.5	*2.86*	(*l*)5.2	(*l*)5.2	....
Per car operated	(*a*)245,163	(*a*)249,705	*1.82*	(*h*)178,358	(*h*)187,173	*4.72*	(*m*)241,275	(*m*)246,032	*1.94*
Per car-hour	(*b*)60	(*b*)60	....	(*p*)44	(*p*)45	*2.23*	(*n*)58	(*n*)58	....
Total passengers	7,141,465,488	7,115,513,825	0.36	(*e*)664,830,692	(*e*)662,025,859	0.42	(*l*)7,806,296,180	(*l*)7,777,539,684	0.37
Per mile of single track	522,078	520,604	0.28	(*e*)85,820	(*e*)86,663	*0.98*	(*l*)364,343	(*l*)365,014	*0.19*
Per car-mile	8.4	8.4	....	(*e*)3.9	(*e*)4.0	*2.50*	(*l*)6.6	(*l*)6.6	....
Ratio: Transfer passengers to revenue passengers, per cent	26.5	26.0	1.92	13.1	12.3	6.51	25.2	24.8	1.61
Car-miles	845,734,745	847,592,698	*0.22*	171,178,091	166,655,977	2.71	1,016,912,836	1,014,248,675	0.30
Per mile of single track	61,828	76,014	*0.30*	21,933	21,650	1.30	47,335	47,472	*0.29*
Per car operated	(*a*)37,233	(*a*)38,085	*2.24*	(*f*)62,175	(*f*)61,824	0.6	(*m*)38,699	(*m*)39,494	*2.01*
Per car-hour	(*b*)9.2	(*b*)9.2	....	(*g*)11.6	(*g*)11.6	....	(*k*)9.5	(*k*)9.5	....
Car-hours	(*b*)87,859,148	(*b*)88,183,278	*0.37*	(*g*)12,312,871	(*g*)11,975,022	2.82	(*k*)100,172,019	(*k*)100,158,300	0.013
Per car operated	(*c*)4,128	(*c*)4,213	*2.03*	(*i*)4,948	(*i*)4,956	*0.16*	(*o*)4,169	(*o*)4,250	*1.88*

Note—Italics denote decrease.
(*a*) 104 companies. (*b*) 118 companies. (*c*) 101 companies. (*e*) 102 companies. (*f*) 74 companies. (*g*) 82 companies. (*h*) 72 companies. (*i*) 52 companies. (*j*) 181 companies. (*k*) 200 companies. (*l*) 223 companies. (*m*) 178 companies. (*n*) 195 companies. (*o*) 153 companies. (*p*) 77 companies.

000 valuation of road and equipment and $754,000 cash. The total assets are $51,913,854.

Liabilities include $16,707,500, par value, of capital stock; $26,841,782 in funded debt; $2,672,000 in notes issued on account of strike. Other items totaling about $4,000,000 are accounts payable and reserved for depreciation and accidents and damage. The surplus is declared to be $866,625.

Taxation of Gross Receipts Upheld

Constitutionality of the 1919 law for taxation of gross receipts of street railway, traction, gas, electric light, heat and power corporations has been upheld by the Court of Errors and Appeals at Trenton. The decision was rendered in an appeal of the Salem & Pennsgrove Traction Company. The court ruled the additional franchise tax imposed by the 1919 law is in the nature of a license tax and not a levy upon property. The State Board of Taxes and Assessments levied a tax of $4,806 on gross receipts of $139,727 for 1920.

Auction Sales in New York.—At the public auction rooms in New York there were no sales of electric railway securities this week.

Preferred Stock Being Offered. — Pynchon & Company, New York, N. Y., are offering 10,000 shares of the cumulative preferred stock, class "A," of the General Gas & Electric Corporation. The price is $100 per share and accrued dividend, yielding 8 per cent.

Preferred Stock Offered.—John Nickerson & Company and Eastman, Dillon & Company, New York, are offering 12,000 shares of the Metropolitan Edison Company's cumulative participating preferred stock. The price is $98 per share and accrued interest to yield about 7.14 per cent.

Notes of Interurban Offered.—Halsey, Stuart & Company and the National City Company, New York, N. Y., are offering for subscription at 100 and interest $1,000,000 of three-year 6½ per cent secured sinking fund gold notes, Series C, of the Chicago, North Shore & Milwaukee Railroad, Highwood, Ill.

Large Increase in Net Income.—For the eight months ending Feb. 28, 1923, the Brooklyn (N.Y.) City Railroad reports a passenger revenue of $7,665,354 against $7,412,175 for the eight months ending Feb. 28, 1922. The net corporate income was $1,318,667 against $950,051 for the eight months ending February, 1922.

Merger Effected.—The merger and consolidation of the Northwestern Pennsylvania Railway, the Northwestern Connecting Railway, the Crawford County Railways and the Peoples Incandescent Light Company into and with the Northwestern Electric Service Company of Pennsylvania has become effective.

Approves Issue.—The Massachusetts Department of Public Utilities has approved the issue by the Holyoke Street Railway of $265,000 6 per cent first mortgage bonds, series C, maturing April 1, 1935. The issue is for the purpose of refunding a like amount of 5 per cent debentures maturing April 1, 1923.

Initial Common Stock Dividend Declared.—The American Water Works & Electric Company, Pittsburgh, Pa., has declared an initial dividend of 1 per cent on the 6 per cent participating preferred stock and the regular quarterly dividend of 1¾ per cent on the 7 per cent cumulative first preferred, both payable May 15 to stock of record May 1.

Gold Bonds Offered.—Halsey, Stuart & Company, New York, The Union Trust Company, Pittsburgh, and W. A. Harriman & Company, New York, are offering $6,000,000 of the first mortgage 5 per cent gold bonds, Series E of the West Penn Power Company. The bonds, due March 1, 1963, are offered at 90 and accrued interest.

Net Income Shows Loss.—The Eastern Massachusetts Street Railway, Boston, Mass., for the two months ended February, 1923, reports revenue and income of $1,868,108 against $1,739,050 for the same period in 1922. The net income was $184,095 for the two months ended February, 1923, and $229,223 for the two months ended February, 1922.

Holders of Chicago Railways Certificates Protest. — Holders of Chicago (Ill.) Railways Series 1 certificates have called a meeting of protest for March 26. They claim that it was agreed at time certificates were distributed that when the company had accumulated a sinking fund of $250,000 certificate holders would receive dividends at the rate of $8 per certificate. There is an unpaid accumulation of $1,384,000.

Increase in Net Income.—For the two months ended Feb. 28, 1923, the Philadelphia (Pa.) Rapid Transit Company reports operating revenue of $7,042,088, against $6,586,706 for the same period in 1922. The net income was $372,219, compared with $350,876 for the two months ended February, 1922. There were 143,428,307 passengers carried in the two months of 1923, with a passenger revenue realized of $6,930,950.

B.R.T. Plan Before Commission.—The plan of reorganizing the Brooklyn Rapid Transit Company (N. Y.), was formally submitted for approval on March 23 to the Transit Commission. George McAneny, chairman of the commission, said that while the commission reserved its final judgment on all the details that required its statutory action, it had been well satisfied with the general scheme developed and with the progress made.

Net Income Increases.—Although for the eight months ending Feb. 28, 1923, the total operating expenses of the Brooklyn (N. Y.) Rapid Transit Company increased more than $1,300,000 the total operating revenues increased sufficiently to produce a net revenue from operation of $50,000 more than the net revenue for the eight months ending Feb. 28, 1922. The net income for the eight months ending Feb. 28, 1923, was $1,732,508 against $1,661,700 for the same period ending Feb. 28, 1922.

Issuance of Equipment Trusts Authorized.—Railway service in Ashland, Wis., will be improved following approval by the Railroad Commission of the application of the Lake Superior District Power Company, parent company of the Ashland Street Railway, Light & Power Company, providing for the issuance of $65,000 equipment trust certificates for the purpose of securing nine cars costing $85,050, $20,050 of which is to be paid in cash.

Gold Bonds Offered.—A syndicate headed by Tucker, Anthony & Company, New York, N. Y., is offering at 99½ and interest to yield more than 6.50 per cent $7,000,000 of first mortgage and refunding lien sinking fund 6½ per cent gold bonds of the Consolidated Power & Light Company. The bonds are dated March 1, 1923, and are due March 1, 1943. The Consolidated Power & Light Company and its subsidiaries will own and operate without competition the gas and electric railway business in Lynchburg besides the electric light and power business in Huntington, W. Va., and Lynchburg and a substantial part of the electric power and light business in Roanoke, Va.

Change Proposed in Financial Structure.—An offering of $6,000,000 convertible 6½ per cent gold debenture bonds of the Standard Gas & Electric Company, Chicago, Ill., due 1933, is being made by H. M. Byllesby & Company, Janney & Company, and Hambleton & Company, at 98, to yield more than 6.75 per cent. The conversion privilege applies to the common stock at prices ranging from $33.33⅓ to $40 per share. The proceeds will be used to retire $2,072,500 face value of 7 per cent notes and to provide additional working capital. A meeting of shareholders has been called for April 3 to authorize a change in the common capital stock from shares of $50 par to shares of no par value and to increase the authorized no par common stock from 300,000 shares to 600,000.

Rochester Doing Better, but Still $160,917 Behind.—The report of Commissioner of Railways Charles R. Barnes of Rochester, N. Y., covering operation of the New York State Railways, shows a surplus of $66,556 for the quarter ended Feb. 28, 1922. The figures were presented to the Council on March 20. The total revenue for the three months was $1,338,672 and the total railway operating expense was $910,203. After all deductions had been made, including the return on investment of $289,479, there remains a surplus of $66,556. Commissioner Barnes' annual report, for the year ended July 31, showed a deficit of $94,001. This added to the deficit for the previous year of operation under service-at-cost made a total deficit of $227,999. The surplus for the quarter Aug. 1 to Nov. 1 was $524, and deducting this sum and the surplus of the last quarter from the total deficit shows a remaining deficit to date, under the service-at-cost contract, of $160,917.

Traffic and Transportation

Accidents Analyzed

Report Submitted Shows That 32 per Cent of Milwaukee Accidents Were Intersection Collisions

That almost one-third of all traffic accidents in the city of Milwaukee during the year 1922 were intersection collisions resulting from two vehicles approaching each other at right angles at street intersections, is one of the conclusions reached in a report recently submitted to the Safety Division of the Milwaukee Association of Commerce.

The report has been prepared at the Safety Division's request from the accident records of the Milwaukee Police Department Traffic Bureau, and of the Milwaukee County Sheriff's and Coroner's records. It is based on an analysis of approximately 4,300 accidents recorded during the last two months of 1921 and the entire year 1922.

The condition of the records was such that most of the desired information was taken directly from these records. In analyzing the records forty-three different causes were assigned which when properly interpreted presented a fair picture of the status of accidents in Milwaukee.

As has already been pointed out, it was found that approximately 1,300 accidents out of a total of 4,200 or about 32 per cent were intersection collisions of two vehicles.

The next largest single group of accidents was one resulting from carelessness of pedestrians. These accidents number about 600 or about 15 per cent of the total. Of these accidents the greater number were due to carelessness, principally "jay walking" either in the middle of the block or diagonally across the street at intersections.

RATIO OF FATALITIES TO ACCIDENTS
CITY OF MILWAUKEE—1922

Cause of Accident	Number of Accidents	Fatalities	Fatalities Per 1,000 Accidents
Motor vehicle crossing tracks.	27	8	296
Speeding.....	39	4	102
Driving while intoxicated....	90	7	73
Children playing in street.....	154	8	52
Carelessness of pedestrian.....	615	16	26
Skidding.....	110	2	18
Intersection accidents.....	1,332	7	5

Of particular interest to electric railway men is Table III of the report which analyzes accidents involving street cars and trains. Here again intersection collisions constitute about a third of the total. Next in importance are accidents resulting from motor vehicles proceeding in the same direction as street cars turning to the left in front of the car. A relatively large number of accidents it is found were due to skidding and about as many were caused by vehicles driving out of parking spaces in front of approaching street cars. The practice of trying to get ahead of street cars is responsible for a number of accidents in which the moving vehicle trying to get ahead of the street car was caught between the street car and an automobile or truck parked along the side of the street.

It was found that there appears to be a relatively large number of accidents between 12 midnight and one in the morning, that there were almost none in the early morning and that they then steadily increased until the peak was reached between 5 and 6 p.m. A decrease followed until midnight. The distribution of accidents by months indicated that the peak was reached in October.

An analysis of accidents resulting in fatalities indicated that the largest specific cause was carelessness of pedestrians and the next largest was children playing in the street. The report points out that vehicle drivers were not always altogether blameless in these cases especially in the cases which occurred outside of the city, that is on suburban roads.

An analysis of accidents by age groups shows that the largest single group was that from six to eleven years of age, the next largest group was five years of age and under, and the next largest eleven to fifteen years of age. The report calls attention to the fact that the number of accidents caused by serious violations of law or traffic ordinances does not constitute a very large proportion of the total, neither was the number of accidents caused by driving while intoxicated a very large proportion of the total.

The highest number of fatalities per thousand accidents resulted from motor vehicles crossing steam road or electric railway tracks. The next highest number was due to speeding. The next number was due to driving while intoxicated, the next in order was due to children playing in the street, the next in order was carelessness of pedestrians, then skidding and finally intersection accidents.

Results of Five-Cent Fare Given —Tariff Continued

The experimental tariff introduced by the Puget Sound Light & Power Company, in the city of Bellingham, providing for twenty street car tokens for $1, a flat 5-cent token rate, has proved a failure as a revenue producer, according to a report submitted by the City Council. The report contained a table of figures showing a loss of $6,468 in revenues for a period of twelve weeks, ending March 11, 1923, in comparison with a similar period ending March 11, 1922. A slight increase in the number of passengers carried during the past twelve weeks was reported, but this gain was not sufficient to make up for the reduction in the former rate of four tokens for 25 cents. Believing that the 90-day period is possibly too short to judge the value of the decrease, the company has agreed to continue the present tariff until midnight of May 31, 1923, and the Council has voted to accept this continuance. The company pointed out that the 5-cent tariff made a 28 per cent reduction in the rate of fare, necessitating an increase of 40 per cent in passenger traffic to keep the revenues to the point where they were prior to the reduction. The increase lacked 33.12 per cent of reaching this figure.

Bill Introduced Provides for Five-Cent Fare

Representatives of the city and the International Railway, Buffalo, N. Y., have reached an agreement on a bill which will be introduced in the Legislature to permit a city-company contract for a 5-cent fare and a 1-cent transfer. Under the proposed legislation the company may be relieved of its franchise, paving and other taxes. Without such tax relief, the International would not consider the restoration of the 5-cent fare, Herbert G. Tulley, president of the International, told Mayor Frank X. Schwab and the municipal authorities.

As its language indicates, the bill is merely permissive. The city and company now cannot enter into an agreement for a 5-cent fare and a 1-cent transfer as the railroad law prohibits a charge for transfers. Neither can the company be relieved of its franchise or paving taxes without special authority from the Legislature.

If the bill is passed the city and company will enter into negotiations for a new fare agreement covering its Buffalo city lines.

Council Turns Down One-Man Car Proposition

In order to keep up service at the 6-cent rate now charged by the Duluth Street Railway it was recently proposed by the Advisory Council of Superior, Wis., that the one-man car be given a trial in that city. This proposal met with a storm of opposition on the part of the labor unions. The City Council turned down the proposition and the matter is now practically as it stood before.

In Duluth the one-man car has never been given a real tryout. Officials of the Duluth Street Railway declare that the finances of the company, in view of its present construction program and its temporary 6-cent fare, will not permit of any experiment along this line. It would mean the purchase of considerable new equipment and would probably meet with some opposition at first on the part of the public, which has never shown any great enthusiasm for the plan.

The one-man car, however, is in operation on two of the company's lines in Duluth, the Park Point and the Kenwood lines. Both lines serve thickly populated districts.

Radial Five-Cent Fare Abolished at Bridgeport

The Connecticut Company is directed, in an order issued on March 28 by the Public Utilities Commission, to return to the flat rate system of fare collection in Bridgeport on April 1. A previous order of the commission permitting a 5-cent fare without transfer privilege is rescinded. This order established a 5-cent fare without transfer on all lines radiating from the center of the city and a 10-cent fare from the center of the city to points beyond the city limits but within the three first fare limits.

The new rate will be a cash fare of 10 cents, or metal tokens, to be sold at the rate of two for 15 cents. Free transfers will be issued.

The action of the commission follows a public hearing which was held in the Bridgeport city hall last week at which testimony was largely in favor of a 7½-cent token fare. The city has been operating under the 5-cent fare order since November 12, 1921.

The order issued at that time authorized the company to charge a flat rate of 5 cents without transfer on all lines radiating from the center of the city, and a 10-cent fare from the center and points beyond the city limits as far as the first fare limit. The order was slightly modified in May, 1922, when the 10-cent rider had the option of buying metal tokens three for a quarter.

In its order the utilities commission said:

> A careful examination and tabulation of the statistics of operating income and expenses show a great improvement over previous revenues in the city of Bridgeport, but present revenues are inadequate to pay a fair return on the fair value of the property used in the public service.

Stock Pledged for New Company

A mass meeting was recently held at Bridgeton, N. J., to ascertain whether the people of that community wanted electric railway service resumed or were satisfied with the buses. The meeting was called at short notice when it was rumored that the trolley tracks would likely be torn up to make room for an improved highway. The entire assets of the old Bridgeton & Millville Traction Company were recently purchased by a resident of Bridgeton. At the mass meeting subscriptions were secured for stock in a new company to operate the railway. Fifty-six residents pledged themselves to take stock in the new company. The Cumberland Traction Company, the new company, has taken over the Bridgeton-Millville division of the company, but buses are being operated in Bridgeton.

The Board of Public Utility Commissioners of New Jersey recently took up the matter of the Cumberland Traction Company, which is seeking a franchise to operate over the route of the old railway. It is claimed that the railway is operating without a franchise. The new company has applied to the state board for permission to issue securities to provide funds to pay for two new cars.

Will Extend One-Man Car Service.—The Charleston (S. C.) Consolidated Railway & Lighting Company has received permission from the City Council of Charleston to extend its one-man car service.

Bus Service Extended.—The Intercity Terminal Railway, North Little Rock, Ark., operating the north side buses announces an extension of bus service on the Little Rock side to Fourth and Louisiana Streets.

New Business Added.—Freight and express business has been added between Abilene, Kan., and Junction City, Kan., by the United Traction System. A freight car also is being run between Junction City and Manhattan over the interurban tracks.

Companies Effect Merger.—The Newburgh Public Service Corporation, a subsidiary of the Orange County Traction Company, has formed an alliance with the Hudson Transit Corporation. Both companies will retain their identity in providing the city of Newburgh with bus operation.

Distinguishes Cars. — The Houston (Tex.) Electric Company has designated all one-man cars by painting a red square on the front. This plan was decided upon in response to a call for suggestions from patrons and to avoid confusion. Front entrance cars were formerly green but repainted yellow. As both old and new type cars are in operation it became necessary to distinguish them.

Detroit Riders Are Customers.—For the purpose of thoroughly educating employees with the understanding that all electric railway passengers are in reality customers, heads of departments of the Detroit (Mich.) Municipal Railway have been asked by Ross Schram, assistant general manager, please to see that whenever new report sheets are printed the word "customer" is substituted for "passenger."

Seeks Polite Employees.—The New Brunswick Power Company, St. John, N. B., has placed in its cars printed cards stating: "The New Brunswick Power Company requests civility and courtesy on the part of its employees and would ask from the public specific instances where this has been deviated from." The company is endeavoring to impress upon its trainmen, especially operators of the one-man cars, the need for being polite even under the most trying circumstances.

Bus Operation Started.—The East St. Louis & Suburban Railway began the operation of two twenty-five passenger White buses in East St. Louis, Ill., on March 15. The bus operation is an experiment which will have influence in shaping the future policy of the company. The fare in the buses is the same as on the electric railway cars, a 7½-cent token or 8 cents cash within the city limits. It was announced in the Jan. 20 issue of the ELECTRIC RAILWAY JOURNAL that the company was planning the installation of the buses.

Book Reviews

Depreciation of Public Utility Properties

By Henry Earle Riggs, A.B., C.E. McGraw-Hill Book Company, New York, 1922; 211 pages.

The publication of a book on this subject is most appropriate at this time because of the important place which depreciation has in valuation of utilities. The author quotes from and analyzes the leading court decisions on depreciation, showing how there has been a gradual development of thought on this subject. He also brings out clearly his own ideas, which include the thought that while a utility is obligated to maintain its property in safe and adequate condition to render continuous service, renewals can and need be made only when due, and "an unmatured obligation to make a renewal is not a loss of value."

Shall State Regulation of Public Utilities Be Abandoned?

An examination of Governor Smith's proposal for municipal control. Issued by the Institute of American Business, New York. Thirty-three pages.

In this pamphlet the subject is considered under four heads, namely, (1) The Attack on State Regulation, (2) Shall We Turn Back the Clock? (3) Governor Smith's Proposals Analyzed, (4) The Good Faith of the State. In the first section a contrast is shown between the Governor's statements in 1919 and 1920 when he indorsed the principle of state regulation and the now famous recommendations in the 1923 message. Statements are then published from different authorities as to the failure of municipal regulation, and arguments are presented for state regulation.

Earning Power of Railroads for 1922

Compiled and edited by Floyd W. Mundy. 442 pages. Published by James H. Oliphant & Company, New York, N. Y.

This book, now in its seventeenth issue, presents important statistics and other facts relating to the earning power and to the securities of railroads, arranged in convenient form for ready reference. The statistics are given for practically all the important railroads in the United States, with a few others.

The introductory chapters explain in a general way the fundamental principles which must be applied by the investor to inform himself as to the value of the stocks or bonds of any railroad.

The tables give vital statistics regarding earnings, mileage, capitalization, tonnage, etc. They are designed to present the statistics mentioned in such a way as to permit of easy comparison between those of each railroad.

The notes give information as to dividends and such other information about the railroads' capitalization, investments, physical and financial condition, etc., as appears to be of direct interest to the investor.

Personal Items

Dr. Hutchinson Joins Engineering Firm

Heads Department of Sanderson & Porter in Charge of Electrification Work

Dr. Cary T. Hutchinson is now associated with Sanderson & Porter, New York, and will direct the department of railroad electrification of that firm. For thirty years he has been engaged in handling railroad electrification problems. In 1891 his then firm, Sprague, Duncan & Hutchinson, built for Henry Villard, who at that early day was considering the electrification of the Chicago freight terminals, the first heavy electric locomotive constructed in this country. It is interesting that nearly a generation later he has just ended service on the commission appointed by the Illinois Central Railroad for planning the electrification of its Chicago terminals.

The Baltimore & Ohio Railroad engaged Duncan & Hutchinson as consulting engineers for the first steam railroad electrification in the United States—built through Baltimore in 1895—and a few years later they made a report to that company on the electrification of the mountain division of its road. This project is now under consideration and there are rumors that it will soon be taken up.

From 1906 to 1908 Dr. Hutchinson was engaged by the Great Northern Railway to take charge of the design and construction of the electric equipment of its road over the Cascade Mountains, the first three-phase electrification to be built in the United States. The considerations that led him to use induction motors for that heavy service were the same that, fifteen years later, influenced the engineers of the Norfolk & Western to use them.

Later the Illinois Central Railroad appointed Dr. Hutchinson a member of its electrification commission. Numerous other investigations and reports on railroad electrification have been made by Dr. Hutchinson. He was selected in 1920 to take charge of the railway electrification division of the Superpower Survey. He has also been connected, as consulting engineer, with many important hydro-electric developments. In addition to these activities, Dr. Hutchinson was, for a time, in charge of the department of electrical engineering at Johns Hopkins University.

As Sanderson & Porter see it, the improved financial condition of the railroads and the urgent need of many of the steam lines for increased facilities, which generally can best be met by electrification, make probable a great increase in the work of this kind. The new department is intended to cover all phases of electrification work.



F. W. Doolittle

New North American Vice-Presidents

Work of Messrs. Fogarty and Doolittle with Huge Holding Company Recognized by Their Advancement

Announcement has just been made of the election of James F. Fogarty and F. W. Doolittle as vice-presidents of the North American Company, New York, effective on April 1.

For the past twenty years Mr. Fogarty has been connected with the North American Company in various capacities. He entered its employ as stenographer in November, 1902. In January, 1910, he became assistant secretary of the company and in March, 1912, was elected secretary and assistant treasurer. He still retains the office of secretary. During the greater part of his long service he has been intimately in contact with the financing of the North American Company and its subsidiaries. He was born in Philadelphia on March 16, 1888. Mr. Fogarty has for several years been a director of the North American Company. He is also vice-president and director of the North American Edison Company and secretary and director of various subsidiary companies of the North American Company, among which are included the Milwaukee Electric Railway & Light Company.



J. F. Fogarty

For several years Mr. Doolittle has been intimately connected with the activities of the North American Company and its subsidiaries as a special rate and valuation engineer with his headquarters at Milwaukee, Wis. Mr. Doolittle was born in Hopkinton, Iowa, in 1883. He was graduated from Princeton University and the University of Colorado. He taught engineering at the University of Colorado and University of Wisconsin and assisted in the development of the statistical department of the Wisconsin Railroad Commission. From there he went to Springfield, Ill., where he did similar organization work for the first Illinois Public Utilities Commission.

In 1914 Mr. Doolittle became director of the Bureau of Fare Research of the American Electric Railway Association and shortly thereafter published his book on electric railway rates and service, known as "Studies in the Cost of Urban Transportation Service." Since 1916 Mr. Doolittle has been retained as consulting engineer by the North American Company and its subsidiaries and has handled investigations of new properties and rates and valuation cases for these companies before various commissions.

Messrs. Horton and Mack Made Vice-Presidents of International Railway

R. Harland Horton, for many years associated with the Philadelphia (Pa.) Rapid Transit Company, has been appointed vice-president in charge of traffic of the International Railway, Buffalo, N. Y. For some time past Mr. Horton has been assistant to the vice-president of the International. Mr. Horton has been a traffic expert with Mitten Management since 1912.

H. L. Mack, who has been with the International Railway, since 1892 in charge of track and maintenance of way, has been elected vice-president in charge of engineering, a new position with the International Railway created by Mitten Management, Inc.

Edgar J. Dickson has resigned as vice-president in charge of traffic of the International Railway, Buffalo, N. Y., according to announcement made by Herbert G. Tulley, president. Mr. Dickson had held the position for almost twelve years, having been appointed when E. G. Connette was president of the company.

Mitten Colors to Fly at Metropolitan Tracks

"Racing," says the New York *Telegram*, "is attracting any number of newcomers to the fold. Two valuable additions are getting together a stable each for campaigning over metropolitan tracks this summer. Joseph B. Choate, Boston banker, has asked for registration of colors and will hope to

see one or more of his newly acquired thoroughbreds land in the charmed circle. Thomas E. Mitten, Philadelphia traction magnate, is also in the fie'd."

Mr. Sparks Goes to Chicago

Ralph M. Sparks became vice-president of the Yellow Coach Manufacturing Company, Chicago, Ill., on April 1 in charge of the public utility division of that company. Mr. Sparks, a native of Muncie, Ind., received his education in the local high school and at Purdue University. In 1910 he became special assistant to President P. F. Sullivan of the Bay State Street Railway. During his nine years with the railway, he filled many positions, being successively general passenger agent, assistant to the general manager, assistant to the first vice-president and transportation manager in charge of operations. In 1919 Mr. Sparks organized a company for the distribution of Willys-Knight cars in Worcester, Mass., and Worcester County. Mr. Sparks, two years later was the prime mover in the organization of the public utility division of the Republic Motor Truck Company at Alma, Mich. In this position, he developed and introduced the Republic Knight motored bus. Fifty-two of these buses were installed in eight cities, namely, Baltimore, Boston, Providence, New Haven, Newark, Youngstown, San Diego and Detroit.

Employee New Director on P. R. T. Board

Ralph R. Nyman, a motorman in the employ of the Philadelphia (Pa.) Rapid Transit Company, on March 21 was elected a member of the board of directors of the company. Mr. Nyman is president of both the Co-operative Welfare Association, the organization of the P. R. T. employees which represents the men in their dealings with the company, and also the Wage Dividend Fund, which represents the men in the profit-sharing plan operated by the company. Mr. Nyman was one of the three new directors elected by the stockholders at the annual meeting. He succeeded John McElroy, the first employee elected to the directorate, who is compelled to step out of the board through promotion to foreman, which ranks him as an official and no longer as an employee. Mr. Nyman was born in Boonesboro, Md., down in the Blue Ridge Mountains. He started out in street railroading in Baltimore, where he worked for five years as a motorman. He then went to Philadelphia. He has been a committeeman from the Belmont carhouse for seven years, being known as "No. 1 committeeman," the one receiving the highest number of votes of the men in the carhouse. Mr. Nyman is a bachelor.

Frank Titus has succeeded M. T. O'Connell as engineer of power stations of the Capital Car Line, Bismarck, N. D., a 1.5-mile line owned and operated by the State.

L. H. Palmer Becomes General Manager

Well Known Baltimore Official Promoted to Post Formerly Held by H. B. Flowers

L. H. Palmer was appointed on March 27 by the board of directors of the United Railways & Electric Company, Baltimore, to the position of general manager of that company, made vacant by the recent resignation of Herbert B. Flowers, who has become president of the New Orleans Public Service, Inc. Mr. Palmer's previous title was assistant to the president, a position which he has held since October, 1917.

Louis Hooker Palmer, through his activity in connection with the solving of various national electric railway problems and in association work, is one of the best known men in the executive and transportation side of the industry. He has a reputation for getting things done, and not only in company, but in association work, puts his whole energy into anything which he undertakes. By his tact and his spirit of helpfulness he inspires a willing co-operation in those with whom he is associated.



L. H. Palmer

Mr. Palmer was born in Chicago. His business life, however, has been spent in the East. After he was graduated from Williams College in 1902, Mr. Palmer was associated with the operating department of the Central Railroad of New Jersey for four years. He then entered the service of the Metropolitan Street Railway, New York, as a clerk in the office of Oren Root, vice-president and general manager. In April, 1908, he was appointed assistant to the general manager for the receivers of that company and a year later was made superintendent of transportation. He resigned in 1912 to join the organization of Harrison Williams. In June, 1915, he went to Baltimore to do some special work for the president of the United Railways & Electric Company, and in the following year became connected with the Eastern Pennsylvania Railways, first as general superintendent and then as general manager. He returned to the Baltimore Company in 1917, at the request of William A. House, then president of the company.

Mr. Palmer was president last year of the American Electric Railway Transportation & Traffic Association and is chairman this year of the American committee on mail pay and the special committee on co-operation with the National Safety Council, as well as a member of other association committees. He is also a director of the Maryland Public Utilities Association, formed recently; a trustee of the United Railways Building Association, vice-president of the Traffic Club of Baltimore, and vice-president and one of the organizers of the Baltimore Safety Council.

William H. Penoyer has replaced A. J. Crane as roadmaster of the Schenectady (N. Y.) Railway.

H. M. Brown has succeeded John Jacobs as vice-president of the Kaydeross Railroad Corporation, Ballston, New York.

J. M. Donington has succeeded George R. Doremus as assistant secretary of the J. G. White Company, Inc., New York, N. Y.

E. T. Jones has replaced S. W. Dill as district claim agent of the electric division of the New York Central Railroad.

A. C. Ray, formerly an assistant treasurer of the American Power & Light Company, New York, N. Y., is now treasurer.

John Nichol, vice-president of the Pine Bluff (Ark.) Company, has been chosen president of the Simmons National Bank of Pine Bluff to fill the vacancy caused by the death of Dr. Z. Orto.

William L. Sayers is continuing as general manager of the Marine Railway, operated between Manhattan Beach and Brighton Beach, N. Y. He will not longer perform the duties of secretary, this office now being taken care of by Robert J. Seekamp.

W. F. Graves, chief engineer of the Montreal (Que.) Railways, has resigned. The assistant chief engineer, R. M. Hannaford, is acting in the capacity of chief engineer.

Charles W. Wilson has succeeded W. F. Tshudy as superintendent of the Penna.-New Jersey Railway, and the New Jersey & Pennsylvania Traction Company, Trenton, N. J.

W. P. Ballard, formerly superintendent of the Visalia Electric Railway, Exeter, Calif., has been appointed Industrial agent for the Southern Pacific System in the San Joaquin Valley.

A. L. McFarland, formerly inspector of the Charlotte (N. C.) Electric Railway, has been promoted to the position of chief inspector. In this capacity he succeeds the late Robert J. Small.

Fred A. Lorentz has been appointed to the position of chief engineer of the Board of Public Utilities of the city of Los Angeles to succeed H. Z. Osborne, Jr., resigned. Mr. Lorentz has been assistant chief engineer of the board for several years. He entered the service of the board twelve years ago.

S. P. MacFadden, secretary to the district manager of Stone & Webster, has been transferred to Port Arthur, Tex., as superintendent of the Port Arthur Light & Power Company and the Port Arthur Ice & Refrigerator Company. Mr. MacFadden relieves Joseph Bowes, who has been transferred to Beaumont, Tex., as general superintendent of the Eastern Texas Electric Company.

E. J. Seaborn, formerly assistant treasurer of the Truckee River Power Company, has been transferred to Houston as assistant treasurer of the Houston Electric Company and the Galveston-Houston Electric Railway. Mr. Seaborn has been with Stone & Webster for sixteen years and was with the Truckee River Power Company for five years. He is taking the place vacated by the transfer of H. L. Harding to Boston in the treasurer's department of Stone & Webster.

Albert E. Reynolds, who resigned in January as general manager of the United Traction Company, Albany, N. Y., to become connected with the engineering firm of Sanderson & Porter, has been made vice-president and general manager of both the Springfield (Mo.) Traction Company and the Springfield Gas & Electric Company, managed by the engineering firm. He succeeds in these positions E. C. Deal, who has become connected with the Electric Bond & Share Company, New York.

Gus W. Wagner, formerly general purchasing agent of the Detroit (Mich.) United Railway, has been placed in charge of the steam and electric railway sales division of the I. M. Jacobson & Sons Company. His offices will be located at 1011 Majestic Building, Detroit, Mich. Mr. Wagner was long connected with the Detroit railway. As a matter of fact he entered its employ as a boy in 1901 under A. H. Stanley, the present head of the London underground group. He caught on quickly and was advanced rapidly through the organization until finally he succeeded A. F. Edwards in the purchasing department when Mr. Edwards was made treasurer. Mr. Wagner's railway career was reviewed briefly in the ELECTRIC RAILWAY JOURNAL for June 10, 1922. Among the products of the Jacobson company are babbitt and bearing metals and white metal alloys.

Claude O. Weidman, general manager of the Morris County Traction Company, Morristown, N. J., has resigned. Otto G. Schultz, treasurer of the company, will in addition assume Mr. Weidman's duties. Mr. Weidman became superintendent of the company eight years ago and three years later was advanced to the position of general manager. Previous to going to Morristown he was superintendent of transportation of the Otsego & Herkimer Railroad. Mr. Charles Fields has been appointed superintendent of the company. The Morris County Traction Company operates an interurban system of more than 58 miles through a well-built-up section of New Jersey.

Mr. Hecht Chairman of the Board

R. S. Hecht, who has been succeeded as president of the New Orleans (La.) Public Service, Inc., by H. B. Flowers, will retain the chairmanship of the board of directors and continue his supervision of the financial affairs of the company. Mr. Hecht is a commanding figure in the financial and banking activities of New Orleans. It was he, very largely, who succeeded in bringing together the representatives of the holders of the various issues of securities of the New Orleans Railway & Light Company and in reconciling the conflicting interests to a workable reorganization plan. He is president of the Hibernia Bank & Trust Company, New Orleans. A portrait and a biography of Mr. Hecht were published in the ELECTRIC RAILWAY JOURNAL for Nov. 11, 1922. A. L. Kempster has been re-elected vice-president and general manager of the company.

The New Orleans *Item* said of Mr. Hecht:

R. S. Hecht leaves the stockholders and bondholders greatly in his debt. In a sense, he achieved the impossible. A number of the policies he introduced and some of the things he did for this company were opposed by this newspaper. However, one can differ with Mr. Hecht, and oppose him, without losing personal regard for him, and even come away with increased respect for his abilities.

Obituary

J. S. Walsh

Julius S. Walsh, eighty years old, financier and retired railroad and electric railway magnate, chairman of the board of directors of the Mississippi Valley Trust Company, St. Louis, and for many years a dominant figure in the financial world of the Central West, died in St. Louis on March 21.

Mr. Walsh was born in St. Louis on Dec. 1, 1842. He was educated in the town schools, later attending St. Joseph College, Bardstown, Ky., where he received his A.B. in 1861; Columbia University, where he obtained his LL.B. in 1864, and his A.M. at St. Louis University the following year. He also received an honorary LL.D. from the latter institution in 1904.

When his father died in 1864, Mr. Walsh became administrator of his estate and succeeded him as a director of the Bank of the State of Missouri and of the Franklin Avenue, Union, Fairgrounds and the Suburban Street Railways.

About 1870, when B. Gratz Brown was ambitious to become Governor of Missouri, he removed his residence from St. Louis to Iron County and upon his election as Governor finally persuaded Mr. Walsh to succeed him as president of the Citizens' Street Railway. Mr. Walsh had built the Northern Central line in 1885, and that and other horse car lines he controlled were the forerunners of the present unified system, the United Railways. Later he became president of the St. Louis & Suburban Railway. In 1875 Mr. Walsh succeeded Mr. Dickson as president of the St. Louis Bridge Company, which built the famous Eads bridge, and remained as its head.

Later Mr. Walsh became interested in electrical development and in 1889 was elected president of the Municipal Electric Light Company. This company was later absorbed by the present Union Electric Light & Power Company, St. Louis.

He organized the Mississippi Valley Trust Company in 1890 and became its president, and in 1906 was made chairman of the board, holding that position at his death.

William Loft, for thirty-two years superintendent of lines of the Springfield (Mass) Street Railway, died in Springfield on March 22, aged seventy. He installed the first telephone system for the New England Telephone & Telegraph Company in Cambridge, which was started with thirty-two subscribers. Later he assisted in building the first trolley systems in Boston and Cambridge for the Thomson-Houston Electric Company. Later, Mr. Loft had charge of overhead construction for the car lines in Utica, N. Y., and other places, following which he went to Springfield to direct similar work there. He was then made superintendent of lines.

Philip Increase Robinson, manager of the Baton Rouge (La.) Electric Company, died on March 22. He had been a prominent figure in the railway and lighting field since 1908, when he entered the statistical department of Stone & Webster, Inc. In less than three months after joining the Stone & Webster forces he was transferred to Houghton, Mich., as assistant to the engineer. He was made assistant superintendent of the Houghton County Traction Company in 1912. Later he entered the lighting field in Houghton, Fort Madison and Dallas. It was only in February of this year that he became manager of the Baton Rouge Electric Company. Mr. Robinson was born in 1886 and made his home in Waterville, Me. He was graduated from the University of Maine in 1906 as an electrical engineer. He is survived by his wife and two children.

Major Abram J. Gifford, formerly in charge of the transportation department of the General Electric Company for many years, died on March 20 at his home in Schenectady after an operation. Major Gifford was born at Hudson, N. Y., in 1849. Prior to his entry into the electrical industry, he was in charge of the Indian agency at Fort Berthold, N. D., from 1884 to 1889, under appointment by President Chester A. Arthur. In 1891 he became connected with the Northwest Thomson-Houston Company at St. Paul, but was transferred in 1894 to the transportation department of the General Electric Company at Chicago. In 1899 he was put in charge of the transportation interests of the company and moved to Schenectady, where he resided until the time of his death. On March 1, 1920, he gave up his active duties, which were taken over by M. C. Fitzgerald, but continued on in an advisory capacity.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

Economic Adjustment Desirable

Report and Recommendations Presented of President's Conference on Unemployment—Mr. Hoover Pleased

The special committee on unemployment from the depression in the business cycle appointed by Secretary Hoover, as chairman of the President's Conference on Unemployment, has made public the conclusions reached after more than a year's study. The committee comprised:

Owen D. Young, president General Electric Company, as chairman; Joseph H. Defrees, formerly president U. S. Chamber of Commerce; Mary Van Kleek, Russell Sage Foundation; Matthew Woll, vice-president American Federation of Labor; Clarence M. Woolley, chairman American Radiator Company, Edward E. Hunt, secretary.

The committee was requested by Secretary Hoover to make an exhaustive investigation into the facts and causes of periodic business depression—hard times—and see if suggestions could be made for remedial steps that might be taken by the business community to avoid such interruptions to prosperity and employment.

Committee Issues Summary of Conclusions

The committee has now issued its own summary of conclusions and suggestions. This will be followed at an early date with the complete publication of the facts and much of the material collected.

The committee analyzes the various economic phenomena of the periodic business boom and sequent depression, and its conclusions are that preventative measures must lie in the better handling of business in boom times because depressions are due to over expansion, inflation, loss of efficiency, waste, and extravagance in the boom periods; that therefore the first point of attack on the problem must be more informed action by individual business men in periods of rising markets in order that excessive expansion may be prevented and the extent of the decline reduced. Stress is laid upon the necessity of better understanding of the business cycle by the business executives generally. The suggestions for control of excessive expansion embraces recommendations as to the control of credit by individual banks, possible control of inflation by the Federal Reserve System, the control by individual business men of expansion in their own business, and the retardation in boom times of governmental and large utility building and construction.

The methods of reducing the extent of the decline lie in the building up of governmental and public utility construction in times of depression, the use of unemployment funds, and the expansion of Federal, State, and farm employment bureaus. The better control of credit against over-expansion and speculation through individual banks and the guidance of business itself by danger signals of over-expansion are fundamental.

The committee considers that before the banks, business men, and others can take constructive action in the enlightened conduct of business in this relation, there must be recruited and constantly disseminated the fundamental information on which the trends in business can be properly adjudged by each individual business man, and it strongly recommends the recruiting of enlarged and more systematic statistical information by the Department of Commerce and its wider dissemination.

The committee calls attention to the fact that the ebb and flow in demand for consumable goods is less controllable than that of construction of buildings and equipment both governmental and private; that the tendencies of boom periods is to thrust a double burden on the community of providing for increased consumable goods and at the same time undertaking the larger burdens of construction; that therefore, the construction industries are to some extent the balance wheel on the ebb and flow of boom and depression.

The committee points out the part the Federal Reserve Banks can play in restriction of speculation and at the same time in liberalizing credit in times of depression.

A questionnaire is proposed to business men, bankers, managers of public utilities, wage earners, and public organizations with a view to stimulating organized consideration and inquiry.

The report does not suggest panaceas or economic revolution, but seeks to drive home the facts that the enlargement of judgment in individual business men as to the trend of business and consequent widened vision as to approaching dangers will greatly contribute to stability, and that the necessary information upon which such judgments can be based must be systematically recruited and distributed.

British Get Indian Contract

The English Electric Company has obtained a contract for the electric equipment of the cars to be used on the Bombay suburban lines of the Great Indian Peninsula Railway. The overhead equipment will be carried out by the British Insulated & Helsby Cables, Ltd.

Westinghouse Air Brake Sees Satisfactory Prospects

The Westinghouse Air Brake Company, Wilmerding, Pa., has submitted its report on operations during 1922. After providing from earnings for federal taxes, dividends and adequate reserves, there was a net addition to surplus of $2,252,881. In consideration of the industrial and financial condition existing early in the year under review it was deemed advisable by the board to reduce the first quarterly dividend from $1.75 to $1 a share and this rate prevailed until the last quarter when the original rate, which it was felt the earnings then justified, was restored.

At a special meeting of stockholders which was held on March 2 the authorized capital stock of the company was increased from $30,000,000 to $50,000,000. The directors on the following day declared a stock dividend of 35 per cent payable April 30 to stockholders of record on March 29. In the statement to the stockholders it was stated that when the last annual report was issued the outlook for the immediate future was not encouraging due to the unsettled business conditions then prevailing, but the prospects for the current year were satisfactory. The annual meeting of the company will be held in Wilmerding on April 10.

National Association of Manufacturers

The annual conference of the National Association of Manufacturers will be held at the Waldorf-Astoria in New York on May 14, 15 and 16.

Hardwood Institute Annual Meeting

The Hardwood Manufacturers' Institute will hold its first annual convention on May 10 and 11 at the Blackstone Hotel, Chicago. The Institute was organized in June, 1922, with some seventy members. Its membership now includes more than 300 hardwood producers, and its lumber inspection force of three men has now increased to an inspection corps of twelve.

Metal, Coal and Material Prices

Metals—New York	March 27, 1923
Copper, electrolytic, cents per lb	17.187
Copper wire base, cents per lb	19.375
Lead, cents per lb	8.25
Zinc, cents per lb	7.975
Tin, Straits, cents per lb	47.50
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	6.50
Somerset mine run, Boston, net tons	3.125
Pittsburgh mine run, Pittsburgh, net tons	2.375
Franklin, Ill., screenings, Chicago, net tons	2.375
Central, Ill., screenings, Chicago, net tons	1.625
Kansas screenings, Kansas City, net tons	2.60
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft	7.50
Weatherproof wire base, N. Y., cents per lb.	19.50
Cement, Chicago net prices, without bags	$2.20
Linseed oil (5-bbl. lots), N. Y., per gal	$1.07
White lead, (100-lb. kegs), N.Y., cents per lb	13.375
Turpentine, (bbl. lots), N.Y., per gal	$1.57

Rolling Stock

Indianapolis (Ind.) Street Railway expects to spend $500,000 for new cars.

Citizens Traction Company, Oil City, Pa., has placed the order as of March 15 for six Birney cars.

Tampa (Fla.) Electric Company has ordered eight single-truck safety cars. Delivery is expected in May.

Youngstown (Ohio) Municipal Railway recently placed an order for eleven buses. By April 1 the fleet will total eighteen buses.

Ashland (Wis.) Street Railway, through the Wisconsin Railroad Commission, has been authorized to provide for the issuance of $65,000 equipment trust certificates for the purpose of securing nine cars costing $85,050.

Montreal (Que.) Tramways is about to call for tenders for the construction of fifty cars. The order will mean an expenditure of approximately $750,000. No particular type of car will be specified in calling for tenders.

Missouri-Kansas-Texas Railway has purchased from the General Motor Truck Company at its branch in Dallas a GMC Model K-20 motor bus. The bus has been placed in service between the city of Waco and Bellmead.

New York, New Haven & Hartford Railroad, New York, N. Y., has increased by five its original contract for electric locomotives recently placed with the Westinghouse Electric & Manufacturing Company. Twelve locomotives are now covered by the contract.

Boston (Mass.) Elevated Railway recently placed orders for fifty cars from the Brill Company, twenty-five from the Laconia Car Company and twenty-five from Osgood-Bradley. These 100 cars are for use on surface lines and are of the same type as the last 200 purchased. They are double-truck cars arranged for one-man operation if desired.

Pittsburgh (Pa.) Railways has placed an order for twenty additional double-truck cars. The cars are to be built by the St. Louis Car Company and equipped with Westinghouse motors and airbrakes. They were added to a recent order for fifty-five cars, making a total of seventy-five new cars to be delivered within four months beginning in June. The cars cost approximately $11,000 each.

St. Petersburg, Fla.—The city is now advertising for bids to be opened on April 2 for the following cars: Three standard, single-truck Birney type safety cars, and one standard double-truck, double-end, safety car, with one double folding door at each end of the right-hand side, arranged for one-man operation and with a seating capacity of fifty-two passengers. Specifications have been sent out to car builders.

Eastern Massachusetts Street Railway, Boston, Mass., as noted in the issue of the ELECTRIC RAILWAY JOURNAL for March 24, has placed an order with the J. G. Brill Company for fifty one-man two-man cars. These cars will be very similar to the twenty-five cars ordered about nine months ago and described in this paper. The order for motors was divided. The General Electric Company will supply motors for twenty of these and the Westinghouse Electric & Manufacturing Company will furnish thirty equipments.

Track and Roadway

Lehigh Valley Transit Company, Allentown, Pa., during 1922 rebuilt 3 miles of track and laid twenty-two blocks of paving.

Three Rivers (Que.) Traction Company, through its manager, states that the company contemplates a $75,000 extension.

Tampa (Fla.) Electric Company will spend about $300,000 in improvements during the present year. Double-tracking of various lines is planned.

Lehigh Traction Company, Hazelton, Pa., and the **Wilkes-Barre & Hazelton Railway** have received 7,000 and 3,000 ties respectively. These will be laid in conjunction with new rails to go down this summer.

Pacific Electric Railway, Los Angeles, Calif., is enlarging its freight storage yards in Los Angeles approximately 100 per cent and some eight freight storage sidings have been completed recently on the company's lines between Los Angeles and the harbor for more adequately handling of this growing freight business.

Salt Lake & Utah Railroad, Salt Lake City, Utah, in co-operation with the federal government will construct a siding and erect a terminal station in connection with the construction of a permanent camp for the accommodation of 5,000 summer training troops. The camp will be established at Jordan Narrows about 12 miles south of Salt Lake City.

Power Houses, Shops and Buildings

West Penn Company, Pittsburgh, Pa., through one of its subsidiary companies, recently purchased the Iron Exchange Building. The growth of the properties has made this step imperative.

Union Traction Company of Indiana, Anderson, Ind., has been manufacturing since Feb. 1 all of its own power at its Anderson plant. The company has shut down the Eaton and Winchester plants.

Louisville (Ky.) Railway, has placed contracts for repairs to its Main Street carhouse, which recently burned, and has secured a building permit for a new office and gymnasium at the Fourth Street carhouse, to cost $30,000. Contracts for rebuilding the Fourth Street property will be placed within a few days.

Trade Notes

Ohmer Fare Register Company, Dayton, Ohio, has issued a series of business lessons illustrating the weakness of any method of collecting fares that is not in harmony with correct business principles.

Cama, Norton & Company, Bombay, India, importers of electrical machinery plants, devices and appliances, are soliciting the catalogs and correspondence of general engineering firms and trade pertaining to allied industries.

Texas Company, New York, N. Y., producer of Texaco petroleum products, has been awarded the contract for the lubricating requirements for the rolling stock equipment of the United Railways & Electric Company, Baltimore, Md., for a period covering eighteen months.

Westinghouse High Voltage Insulator Company, Derry, Pa., a subsidiary of the Westinghouse Electric & Manufacturing Company, has started work at Emeryville, Calif., on the first high-voltage porcelain insulator works to be built west of the Mississippi River.

Rubber Insulated Metals Corporation, New York, N. Y., announces that about April 1 it will remove its general offices from 50 Church Street, New York City, to 18 Oliver Street, Newark, N. J. This concern manufactures the well known "Rimco" rubber-insulated pliers, screw drivers, and other tools—popularly known as "the safety tools" for linemen and high-tension work. The new location will give the Rubber Insulated Metals Corporation larger accommodations and afford the company every facility for handling a steadily increasing business.

Metal & Thermit Corporation, New York, N. Y., has appointed Charles F. Lederer as general supervisor of rail welding to assume entire charge of all technical work in the field. This appointment is made in order to organize more effectively for the greatly increasing thermit rail welding business. Mr. Lederer is well fitted for this new position. He has been connected with the rail welding department of the corporation for more than two and a half years and was formerly superintendent of way of the Milwaukee Electric Railway & Light Company.

New Advertising Literature

Walter A. Zelnicker Supply Company, St. Louis, Mo., has issued Bulletin 300, giving useful information in regard to track material and describing its products.

Kinnear Manufacturing Company, Columbus, Ohio, has issued an illustrated booklet entitled "Exposure Hazard and Window Protection," showing how the Kinnear steel rolling shutters safeguard buildings from fire. Shutters approved by the Underwriters Laboratories, Inc., are illustrated and described.

PEACOCK STAFFLESS BRAKES

—For Safety Cars—



Necessary Safety Equipment

To meet overload conditions

RARELY does any passenger vehicle have to carry a live load of passengers equal to its own dead weight. Yet the standard Birney safety car comes nearer to being called on for such a task than any other type of car. One hundred passengers jammed in one of these little cars will weigh about as much as the car itself.

The one hand brake designed especially to meet such a condition is the Peacock Staffless Brake. It is an equipment designed to apply *almost unlimited* braking power right up to the skidding point, even with the heaviest passenger load that can be packed in. Moreover it has a drum and housing *big enough* to wind up all the chain that can come in, without jamming or clogging.

Investigate this proposition for yourself, before some unfortunate accident forces you to realize the inadequacy of the ordinary hand brake.



Peacock Staffless Brakes are not only safer, but they actually save money by reducing maintenance costs.

Write for full particulars.

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Incorporated
Business Established 1894
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BEARINGS:
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ARMATURE BABBITT
and Similar Products



The quality of wheel metal is of paramount importance. We use a special alloy that is comparatively soft, yet extremely tough and durable with highest conductivity.

MORE-JONES BRASS & METAL CO.
St. Louis Missouri
QUALITY PRODUCTS

JOINT BOOSTERS PROVE

No more labor, time or space is required they last many times longer





Poor Foundations Cause Loose and Sunken Joints

Low joints often necessitate reconstruction long before that portion of the track, lying between the joints, has given its maximum of service.

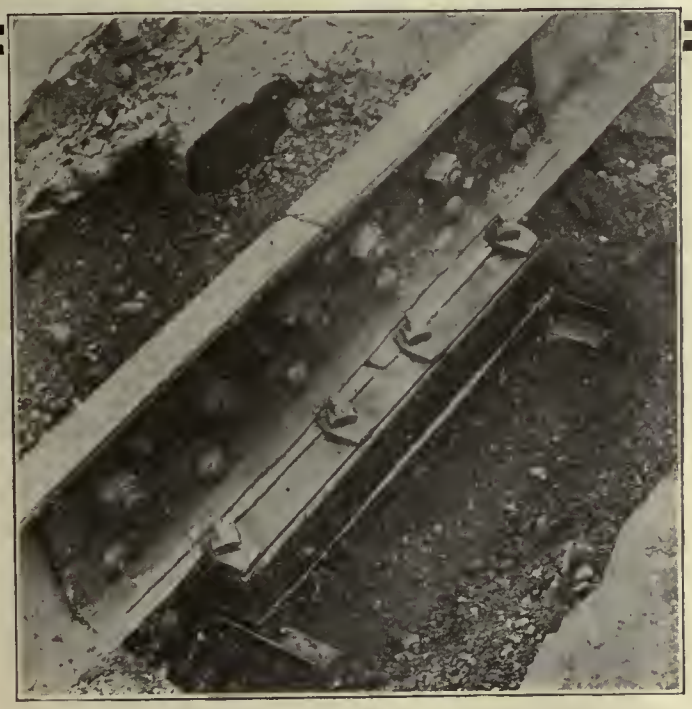
Shimming is only an expensive temporary repair and does not remedy the real cause of the joint failure.

The permanent cure is the Dayton *Resilient* Joint Booster.

DAYTON

HIGHLY SATISFACTORY—

than on ordinary makeshift repairs—
and cost only $4.50 per joint





Joint Boosters, set in concrete effect a permanent cure

The Dayton *Resilient* Joint Booster costs only $4.50 per joint and the expense of installing it is practically the same as that required to make a temporary repair. Tearing away and relaying the pavement is by far the biggest item of expense, in repairs of this kind. Boosters eliminate the necessity of repeating this work every few months.

The Joint Booster is simply a section of the *Resilient* joint tie used in new track construction, strengthened throughout for the exceptional service to which it is adapted. The shock absorber in the booster itself protects the concrete foundation, as well as the surrounding pavement.

Why not make a permanent job of it and eliminate all further paving and track repairs?

Send in an order for Dayton *Resilient* Joint Boosters and satisfy yourself. They have proved satisfactory wherever they have been used—you take no risk. Facts and figures will be sent on request that prove their great saving.

Resilient
JOINT BOOSTER

THE DAYTON MECHANICAL TIE CO.
707 Commercial Building, Dayton, Ohio

Canadian Representative
Lyman Tube and Supply Co., Ltd., Montreal, Quebec



One of the 81 White Busses Bought by the Pacific Electric Railway Co. and the Los Angeles Railway Co.

A Record Order

Pacific Electric Railway Co. and Los Angeles Railway Co. Purchase 81 White Model 50 Busses

THE largest order for motor busses ever placed by an electric railway has been received by The White Company from the Pacific Electric Railway Co., one of the leaders in the electric railway field. The order calls for 71 White busses. At the same time the Los Angeles Railway Co. placed an order for 10. Both orders specify the Model 50 chassis, which was designed solely for passenger transportation.

The busses, which are of the 25-passenger enclosed type, will be used to supplement the street car and interurban service of both lines in Southern California.

The big order followed a thorough investigation by the Pacific Electric of bus operation as adopted by a number of electric roads.

A few of the other well known electric railways operating White Busses are:

Milwaukee Electric Railway & Light Co.
The Pennsylvania-Ohio Electric Co.
The Connecticut Co.
Northern Ohio Traction & Light Co.
Chicago, North Shore & Milwaukee Railroad
Boston Elevated Railway Co.
United Electric Railways Co.
Washington Railway & Electric Co.
East St. Louis Electric Railway Co.
Beaver Valley Traction Co.
Shore Line Electric Railway Co.
Rockford & Interurban Railway

THE WHITE COMPANY, *Cleveland*

White Busses



Bates Engineers will gladly co-operate with you in your planning.

Bates Steel Pole Strength

The stability of installations built with Bates Poles as the ***backbone*** of the construction reflects the progressive trend of the organization using them.

Use Bates Poles—Poles of a character consistent with the high standards you demand and specify for the rest of your equipment. Bear in mind Bates prices compare favorably with the cheapest substitutes.

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BATES ONE PIECE EXPANDED STEEL POLES



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—with especially designed reinforcements for severe service.

COLUMBIA 1893 MACHINE WORKS

Brooklyn, N. Y.

Specify HALE & KILBURN SEATS

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Best Seats for City Cars
Interurban Lines, One Man Cars
Trolley Buses

Neatest
Lightest
Strongest
Simplest



Lightest Weight Stationary Steel Seat



Lightest Weight Walkover Steel Seat

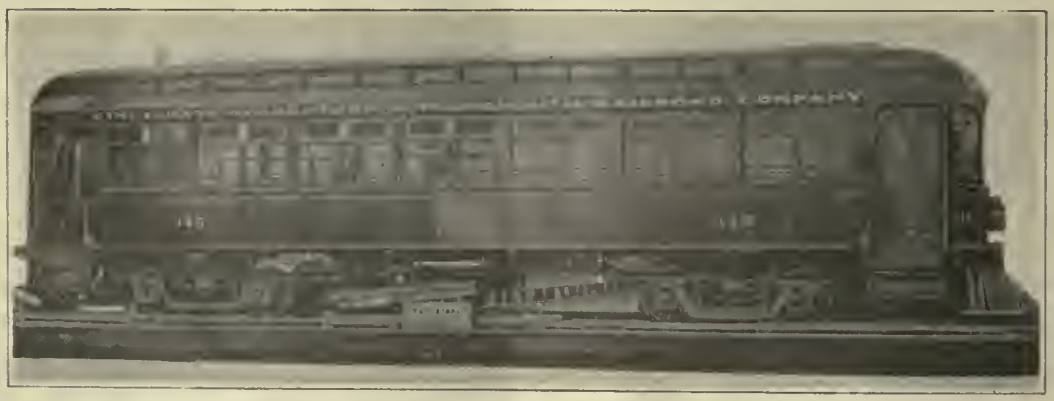
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Write for particulars

Hale & Kilburn Corporation
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WHY

St. Louis Car Co. Quality

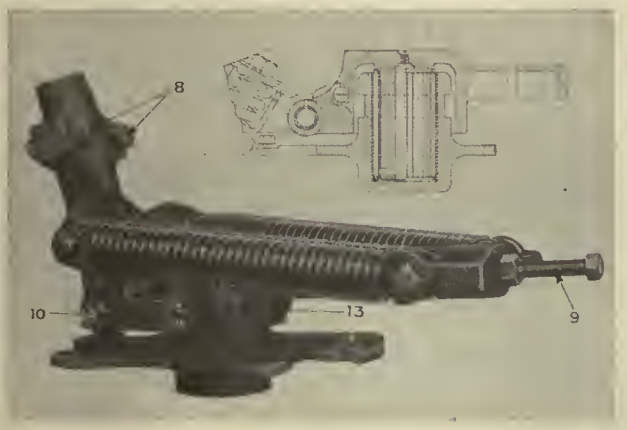


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Write for Catalogue No. 103

St. Louis Car Co., St. Louis, U. S. A.

No. 1



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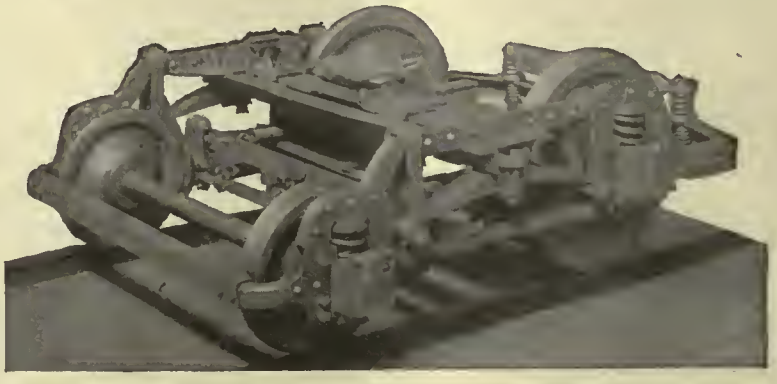
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A shoe manufacturer whose store in New York City is in a rather out-of-the-way locality recently called the attention of the reading public to these familiar lines:

"If a man can write a better book, preach a better sermon, or make a better mousetrap than his neighbor, though he build his house in the woods, the world will make a beaten path to his door."

For many years people have beaten a path to this shoe manufacturer's door. He has proved the truth of this famous aphorism.

And where did he publish this quotation which he applies with such pride to his business?

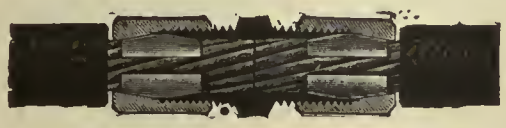
Why, in an advertisement, to be sure—for this manufacturer is a consistent and regular advertiser, and when he has anything to say, he says it through his advertising. It may fairly be assumed that he would not look for a thriving business in the best of mousetraps, or shoes, if people were not told about them as people expect to be told—through advertising.

Of course, people do find out which are the best mousetraps, the best shoes, the best tires, the best breakfast foods, and buy them in preference to others.

And people today are pretty well aware that when a manufacturer puts Advertising back of the thing he makes, he is telling the world that the path to his door is a broad highway.

[Published by The Electric Railway Journal in co-operation with The American Association of Advertising Agencies]

Dossert Connectors

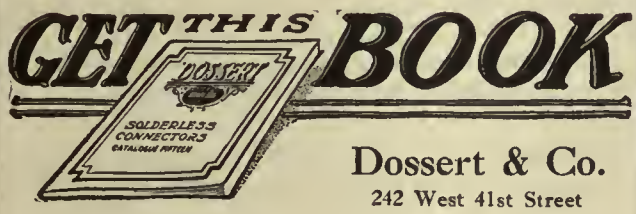


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Cross Ties — Bridge Timbers
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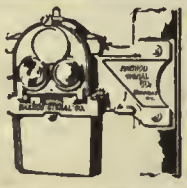
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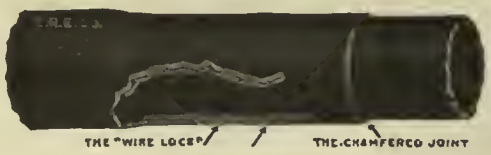
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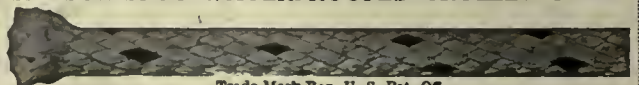
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American Steel & Wire Company
CHICAGO
NEW YORK

ERICO Rail Bonds

Brazed Bonds		Arc Weld Bonds	
Type ET	head of rail	Type AT-F	head of rail
Type EA		Type AT-R	
Type EC,	web of rail	Type AU	
		Type A,	base of rail

The Electric Railway Improvement Co.
Cleveland, Ohio

NASHVILLE TIE COMPANY

Cross Ties: White Oak, Chestnut, and Treated Ties.
Oak Switch Ties.

Prompt shipment from our own stocks.

Headquarters—Nashville, Tenn.

A. D Andrews, Terre Haute, Ind., Representative.

STEEL 'CARNEGIE'

When you think of Steel—think of Carnegie



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One-Piece Gear Cases
Seamless—Rivetless—Light Weight
Best for Service—Durability and Economy. *Write Us.*

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Peirce Forged Steel Pins with Drawn Separable Thimbles

Your best insurance against insulator breakage

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Lapp Insulators
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Trade Mark

Ramapo Iron Works Established 1881 — Ajax Forge Company Established 1881

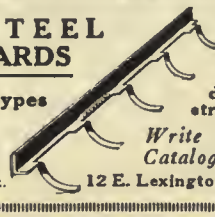
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Successor
HILLBURN, NEW YORK
Chicago New York Superior, Wis. Niagara Falls, N. Y.
Automatic Return Switch Stands for Passing Sidings
Automatic Safety Switch Stands
Manganese Construction—Tee Rail Special Work

"Make it of Vul-Cot Fibre"

NATIONAL VULCANIZED FIBRE CO.
WILMINGTON DELAWARE

GODWIN STEEL PAVING GUARDS

Adapted to all types of rails and paving.



Proven by service to economically prevent seepage and disintegration of street railway paving.

Write for Illustrated Catalog No. 20.

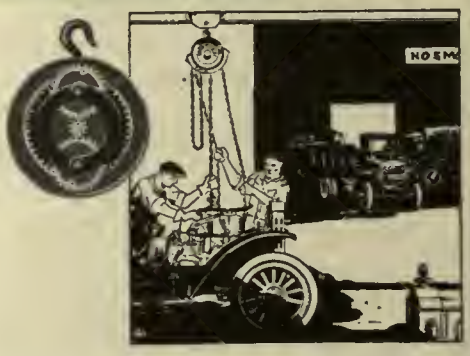
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Extravagant promises, anyone
can sell once.
"Tool Steel" gears sell
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Tool Steel Quality

The Tool Steel
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For Accurate Placing

THE Tribloc lowers its load gently and accurately into place. To understand why, one has only to examine the planetary gear system. Such a well balanced drive insures absolute smoothness of operation. A Tribloc will never jump, jam, or jerk under its proper load.

Write for information on any type or capacity to 40 tons. 2217-D

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ALMACOA ALLIED MACHINERY COMPANY OF AMERICA ALMACOA
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Waterproofed Trolley Cord



Is the finest cord that science and skill can produce. Its wearing qualities are unsurpassed.

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If you are not familiar with the quality you will be surprised at its ENDURANCE and ECONOMY.

Sold by Net Weights and Full Lengths

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Manufacturers of bell, signal and other cords.
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A LUBRICANT

We make a specialty of

ELECTRIC RAILWAY LUBRICATION

We solicit a test of TULC on your equipment.

The Universal Lubricating Co.
Cleveland, Ohio

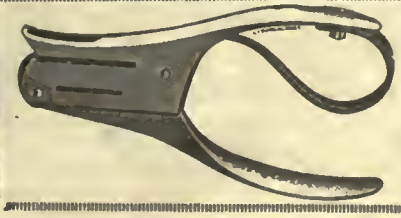
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high-grade R. R. Track and Car Jacks

The Buckeye Jack Mfg. Co.
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Fare Boxes *Change Carriers*

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COUNTERS SORTERS WRAPPERS

THE CLEVELAND FARE BOX CO.
CLEVELAND, OHIO
Canadian Branch, Preston, Ontario.



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Electrical Machinery, Steam Turbines, Steam Engines, Condensers, Gas and Oil Engines, Air Compressors, Air Brakes

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Frogs, Crossings, Metes and Tongue-switches. Super-quality materials. Par-excellent designs. Gives many lives to one, of ordinary construction and when worn down. CAN BE RESTORED by INDIANAPOLIS WELDING.

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Fluxated heat treated Metal Electrodes, Insure Uniform Dependable Welds that are from 75 per cent to 100 per cent more efficient, than the "MELT." from the same High Grade basic stock, untreated.

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Eliminate "Joints" and "Bonds" in Street Track. Higher in Strength and Conductivity than the unbroken Rail. Installed according to instructions, have proven THOROUGHLY DEPENDABLE, during 10 YEARS of "Time and Usage" TEST. Extensively used in 48 STATES and CUONTIES. Recognized as paramount MAINTENANCE ELIMINATORS.

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are Pre-eminently "Money Savers." YES—"Money Makers" for Electric Railways.

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Made in various types and sizes to meet the requirements of service on street and city system.

Complete line of registers, counters and car fittings.

Exclusive selling agents for HEEREN ENAMEL BADGES.

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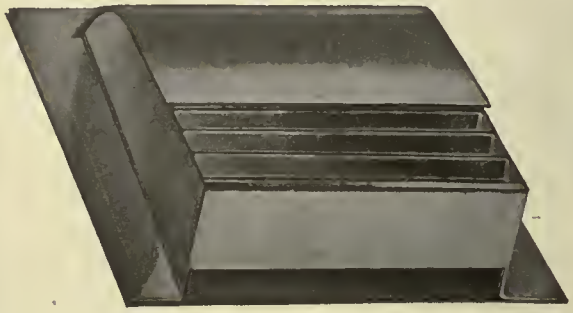
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A necessity for turbine protection, engine cylinder economy and utilization of superheat for all its benefits

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VENTILATORS



THE N-L New Style Type C Ventilator is absolutely weatherproof, lays low on roof, looks well and meets every requirement of ventilation.

More than seven thousand N-L Ventilators sold during 1922.

The Nichols-Lintern Company
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N-L Products manufactured and sold in Canada by
Railway and Power Engineering Corporation, Ltd., 133 Eastern Avenue, Toronto, Ontario

You're having brush trouble

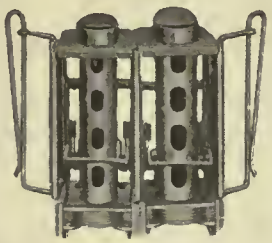
CORRECT IT
USE LE CARBONE CARBON BRUSHES

They talk for themselves

COST MORE PER BRUSH
COST LESS PER CAR MILE

W J. Jeandron
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JOHNSON Universal Changer



Adjustable
The best changer on the market. Can be adjusted by the conductor to throw out a varying number of coins, necessary to meet changes in rates of fares.

Flexible
Each barrel a separate unit, permitting the conductor to interchange the barrels to suit his personal requirements, and to facilitate the addition of extra barrels.

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Ravenswood, Chicago, Ill.

BETTER THAN BABBITT

wears longer—runs cooler—costs less

used by electric railways at home and abroad
AJAX BULL BEARING ALLOY.
made from the purest virgin metals to a scientifically correct formula by the AJAX PROCESS which greatly increases endurance and wearing qualities.

THE AJAX METAL COMPANY
Established 1880
Main Office and Works: Philadelphia, Pa.



Car Seating, Broom and Snow Sweeper Rattan, Mouldings, etc.

AMERICAN RATTAN & REED MFG. CO.
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AMERICAN means QUALITY
RATTAN SUPPLIES OF EVERY DESCRIPTION

"Paint Sells Transportation"

Let us show you

BECKWITH-CHANDLER COMPANY
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Rolled and Forged
GEAR BLANKS

Midvale Steel and Ordnance Company
Cambria Steel Company
General Offices:
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Direct Automatic Registration By the Passengers
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UNDISPLAYED—RATE PER WORD:

Positions Wanted, 4 cents a word, minimum 75 cents an insertion, payable in advance.

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Proposals, 40 cents a line an insertion.

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Box Numbers in care of any of our offices count 10 words additional in undisplayed ads.

Discount of 10% if one payment is made in advance for four consecutive insertions of undisplayed ads (not including proposals).

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1 to 3 inches.....$4.50 an inch
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An advertising inch is measured vertically on one column, 3 columns—30 inches—to a page.

E. R. J.

POSITIONS VACANT

WORKING car-house and shop foreman wanted for a small electric railway in New England, familiar with car wiring, the most modern equipment and one-man cars. State experience. P-536, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

POSITIONS WANTED

ENGINEER with 10 years' experience in the construction and appraisal of electric railway and power properties wishes position. Will be available April 15th. Address, PW-534, Electric Railway Journal, Real Estate Trust Building, Philadelphia, Pa.

MASTER mechanic with experience on city, suburban and high-speed interurban equipment (six years with Detroit United lines), desires position, preferably in the South. Personal reasons for desiring change. Good references. Can get results under any conditions. H. R. Retter, 2219 Allen Street, East Chattanooga, Tenn.

ROAD master, 20 years' experience, construction and maintenance of large properties. Married. Age 35. PW-535, Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.

SUPERINTENDENT of transportation with a proven successful record of 18 years on high grade properties solicits correspondence with managers that are in need of a capable, practical, progressive superintendent of transportation, that can get results. At present employed. Present relations pleasant, personal reasons for desiring change. High grade references as to character and ability. Address PW-537, Elec. Ry. Journal, Leader-News Bldg., Cleveland, O.

SUPERINTENDENT of transportation. Twenty years' experience in electrical line, operating city, interurban and suburban property. Good record based on long experience with large property. Present relations are pleasant, personal reasons for desiring a change. PW-533, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

FOR SALE

G. E. CO. ROTARY CONVERTER

60 cy., 13,200 or 6600 v. A.C. to 590 v. D.C., 2200 kw.

Includes the following:

Item 1—Type HCC, 16 pole, 2200 kw., 450 r.p.m., 590 v. Synchronous Converter with booster and instruments.

Item 2—3 type WC, 60 cy., 900 kva., 13,200-6600 v. primary, 368 v. secondary, water-cooled Transformers with 10% taps above and below normal and 50% starting tap.

Item 3—Complete 3 panel switchboard for the above. Built 1917

Has been run only for test—prompt shipment—attractive price

Picture of Converter appeared in March 17th issue.

Apply General Chemical Company
40 Rector St., New York, N. Y.

FOR SALE

12—New G. E. 247 Motors

TRANSIT EQUIPMENT COMPANY
501 Fifth Avenue, New York.

FOR SALE

20—Peter Witt Cars

Weight Complete, 33,000 lbs.

Seat 53, 4—G. E. No. 258-C Motors, K-12-H Control, West. Air Taylor Trucks, R.H. Type. Complete.

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa.

ROTARY CONVERTER

1—300-kw., 25-cy. West. Will sell or trade for 60-cy. Converter of same capacity.

KANKAKEE & URBANA TRACTION CO.
Urbana, Ill.

TRUSTEES SALE

By decree of the Common Pleas Court of Montgomery County, sitting in equity, the Norristown Trust Company, Trustee, will sell at the Court House, Norristown, Pa., in Court room No. 1 at one o'clock P. M. on Monday, April 30, 1923, all the charter and franchise rights, together with all its property, leaseholds, railway and transmission lines, rolling stock, and all property, real, personal and mixed, of the Montgomery Transit Company, whose built line extends from Trooper to Harleysville, all in Montgomery County, and about 12¾ miles in length, with contract connections into Norristown and other points. See full advertisement in Norristown Herald. Further information furnished by Trustee. Certified check of $5,000 required to be filed with Trustee one hour before sale by bidders, 10 per cent at close of sale, balance sixty (60) days after confirmation. Knock down price $150,000. Further conditions at sale.

By Norristown Trust Company,
Trustee.

Aaron S. Swartz, Jr.
Franklin L. Wright,
Solicitors.
Norristown, Penna.

FOR SALE

1 Single Truck Car

Remodeled for One-Man Operation

Longitudinal Seats; Golden Oak Finish; Brill 21-E Trucks; 33-in. Wheels; 7-ft. 6-in. Wheel Base; Westinghouse 12A Motors; K-10 Controllers; Folding Doors and Steps, Hand Operated.

Length over bumpers 28-ft. 2-in.
Width 8-ft. 0-in.
Height 11-ft.-0-in.
Weight about 15 Tons.

Excellent condition

Vincennes Electric Railway Co.,
Vincennes, Indiana.



No. 201—2—3—6.
4—45-ft. Interurban Passenger and Baggage Cars—Wood Body, End Entrance, Cane Seat, Monitor Roof Motor G.E. 57, Quadruple, 2-Turn Control Westinghouse, K-14, Single End. Brakes, Westinghouse, Compressors, Nat. Brake & Electric Co. B.B. 2 Baldwin Trucks, 34-in. Wheels, 4½-in. Axles, Each $2,000.00.



No. 207.
Interurban Passenger and Baggage, All Steel Center Entrance, 51-ft. Car, Motor, Westinghouse, 306 V 4 Quadruple. Control Westinghouse H.L., Brakes, Westinghouse, with Nat. Brake Compressor, B.B.2, Baldwin Trucks, 34-in. Wheels, 5-in. Axles, $4,500.00.

Ten other cars in very good condition are covered by our Bulletin—mailed upon request.

BUFFALO HOUSE WRECKING & SALVAGE CO.

Buffalo, N. Y. **Phone, Fillmore 1856**

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car
Collier, Inc., Barron G.
Air Receivers, Aftercoolers
Ingersoll-Rand Co.
Anchors, Guy
Electric Service Sup. Co.
Ohio Brass Co.
Standard Steel Works Co.
Western Electric Co.
Westinghouse E. & M. Co.
Armature Shop Tools
Elec. Service Supplies Co.
Automatic Return Switch Stands
Ramapo Ajax Corp.
Autos and Busses
White Co., The
Automatic Safety Switch Stands
Ramapo Ajax Corp.
Axles
Bemis Car Truck Co.
Cambria Steel Co.
Midvale Steel & Ord. Co.
St. Louis Car Co.
Standard Steel Works Co.
Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co
Westinghouse E. & M. Co.
Axle Straighteners
Columbia M. W. & M. I. Co.
Babbitt Metal
Ajax Metal Co.
More-Jones Br. & Metal Co
Babbitting Devices
Columbia M. W. & M. I. Co.
Badges and Buttons
Electric Service Sup. Co.
Internat'l Register Co., The
Bearings and Bearing Metals
Ajax Metal Co.
Baldwin Locomotive Works
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Gilbert & Sons, B. F. A.
Le Grand, Inc., Nic
More-Jones Br. & Metal Co.
Westinghouse E. & M. Co.
Bearings, Center and Roller Side
Stucki Co., A.
Bearings, Roller
Stafford Roller Bearing Car Truck Corp'n
Bells and Gongs
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Consolidated Car-Heating Co.
Electric Service Sup. Co.
Western Electric Co.
Bollers
Babcock & Wilcox Co.
Boiler Tubes (Charcoal Iron and Steel)
Cambria Steel Co.
Midvale Steel & Ord. Co.
Bonding Apparatus
American Steel & Wire Co.
Electric Railway Improvement Co.
Electric Service Sup. Co.
Indianapolis Switch & Frog Co.
Ohio Brass Co.
Rail Welding & Bonding Co.
Railway Track-work Co.
Western Electric Co.
Bonds, Rail
American Steel & Wire Co
Electric Railway Imp. Co.
Electric Service Sup. Co.
General Electric Co.
Indianapolis Switch & Frog Co.
Ohio Brass Co.
Railway Track-Work Co.
Rail Welding & Bonding Co.
Western Electric Co.
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McGraw-Hill Book Co.
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Electric Ry. Equip. Co.
Electric Service Sup. Co.
Hubbard & Co.
Ohio Brass Co.
Western Electric Co.
Brake Adjusters
National Ry. Appliance Co.
Westinghouse Tr. Br. Co.
Brake Shoes
Amer. Br. Shoe & Fdry. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Brakes, Brake Systems and Brake Parts
Ackley Brake & Supply Corp.
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
National Brake Co.
Safety Car Devices Co.
Westinghouse Tr. Br. Co.
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General Electric Co.
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Le Carbone Co.
Westinghouse E. & M. Co.
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Ingersoll-Rand Co.
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Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
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St. Louis Car Co.
Bushings
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Bushings, Case Hardened and Manganese
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Brill Co., The J. G.
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Hale & Kilburn
Heywood-Wakefield Co.
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Cambric, Tapes, Yellow & Black Varnished
Irvington Varnish & Ins. Co.
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Westinghouse E. & M. Co.
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Differential Steel Car Co.
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Cars, Gas Rail
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Cars, Passenger, Freight Express, Etc.
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Anderson Mfg. Co., A. & J. M.
Dossert & Co.
Electric Ry. Equip. Co.
Electric Service Sup. Co.
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Westinghouse E. & M. Co.
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Coils, Armature and Field
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Cranes
Allis-Chalmers Mfg. Co.
Cross Arms (See Brackets)
Crossings
Ramapo Ajax Corp.
Crossing Foundations
International Steel Tie Co.
Crossing Frog & Switch
Ramapo Ajax Corp.
Wharton, Jr., & Co., Wm.
Crossing Manganese
Indianapolis Switch & Frog Co.
Ramapo Ajax Corp.
Crossing Signals (See Signals, Crossing)
Crossings Track (See Track) Special Work)
Crossings, Trolley
Ohio Brass Co.
Crushers, Rock
Allis-Chalmers Mfg. Co.
Curtains and Curtain Fixtures
Brill Co., The J. G.
Electric Service Sup. Co.
Morton Mfg. Co.
Dealers' Machinery
Electric Equipment Co.
Derailing Devices (See Track Work)
Derailing Switches
Ramapo Ajax Corp.
Destination Signs
Columbia M. W. & M. I. Co.
Electric Service Sup. Co.
Detective Service
Wish Service, P. Edward
Door Operating Devices
Con. Car-Heating Co.
Nat'l Pneumatic Co., Inc.
Safety Car Devices Co.
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Brill Co., The J. G.
General Electric Co.
Hale & Kilburn
Doors, Folding Vestibule
Nat'l Pneumatic Co., Inc.
Draft Rigging (See Couplers)
Drills, Rock
Ingersoll-Rand Co.
Drills, Track
American Steel & Wire Co.
Electric Service Sup. Co.
Ingersoll-Rand Co.
Ohio Brass Co.
Dryers, Sand
Electric Service Sup. Co.
Ears
Ohio Brass Co.
Electrical Wires and Cables
Amer. Electrical Works
American Steel & Wire Co.
Roebling's Sons Co., J. A.
Western Electric Co.
Electric Grinders
Railway Track-Work Co.
Electrodes, Carbon
Indianapolis Switch & Frog Co.
Railway Track-Work Co.
Electrodes, Steel
Indianapolis Switch & Frog Co.
Railway Track-Work Co.
Enamels
Beckwith-Chandler Co.
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Allison & Co., J. R.
Archbold-Brady Co.
Arnold Co., The
Beeler, John A.
Bibbins, J. Rowland
Day & Zimmermann
Ford, Bacon & Davis
Hemphill & Wells
Holst, Englehardt W.
Jackson, Walter
Ong, Joe R.
Parsons, Klapp, Brinkerhoff & Douglas
Richey, Albert S.
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Sanderson & Porter
Stevens & Wood, Inc.
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Ingersoll-Rand Co.
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Cleveland Fare Box Co.
Johnson Fare Box Co.
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Cambria Steel Co.
Midvale Steel & Ord. Co.
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American Steel & Wire Co.
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Consolidated Car Fender Co.
Electric Service Sup. Co.
Le Grand, Inc., Nic
Fibre and Fibre Tubing
National Vulcanized Fibre Co.
Westinghouse E. & M. Co.
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Flangeway Guards, Steel
Godwin Co., Inc., W. S.
Forgings
Cambria Steel Co.
Carnegie Steel Co.
Columbia M. W. & M. I. Co.
Midvale Steel & Ord. Co.
Standard Steel Works Co.
Frogs & Crossings, Tee Rail
Ramapo Ajax Corp.
Frogs, Track (See Track Work)
Wharton, Jr., & Co., Wm.
Frogs, Trolley
Ohio Brass Co.
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Columbia M. W. & M. I. Co.
Consolidated Car-Heating Co.
General Electric Co.
Western Electric Co.
Westinghouse E. & M. Co.
Williams & Co., J. H.
Fuses, Refillable
Columbia M. W. & M. I. Co.
General Electric Co.
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Ohio Brass Co.
Gaskets
Power Specialty Co.
Westinghouse Tr. Br. Co.
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General Electric Co.
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Westinghouse E. & M. Co
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Brill Co., The J. G.
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Carnegie Steel Co.
Midvale Steel & Ord. Co.
Standard Steel Works Co.
Gear Cases
Chillingworth Mfg. Co.
Columbia M. W. & M. I. Co.
Electric Service Sup. Co.
Westinghouse E. & M. Co.
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Ackley Brake & Supply Corp.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Electric Service Sup. Co.
General Electric Co.
National Railway Appliance Co.
Nuttall Co., R. D.
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General Electric Co.
Generators
Allis-Chalmers Mfg. Co.
Western Electric Co.
Westinghouse E. & M. Co.
Girder Rails
Lorain Steel Co.
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Indianapolis Switch & Frog Co.
Smith Heater Co., Peter
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Greases (See Lubricants)
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Railway Track-Work Co.
Grinders, Portable
Railway Track-work Co.
Grinders, Portable Electric
Railway Track-work Co.
Grinding Bricks and Wheels
Railway Track-work Co.
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Ramapo Ajax Corp.
Guard Rails, Tee Rail and Manganese
Ramapo Ajax Corp.
Guards, Trolley
Electric Service Sup. Co.
Ohio Brass Co.
Hammers, Pneumatic
Ingersoll-Rand Co.
Harps, Trolley
Anderson Mfg Co., A. & J. M.
Electric Service Sup. Co.
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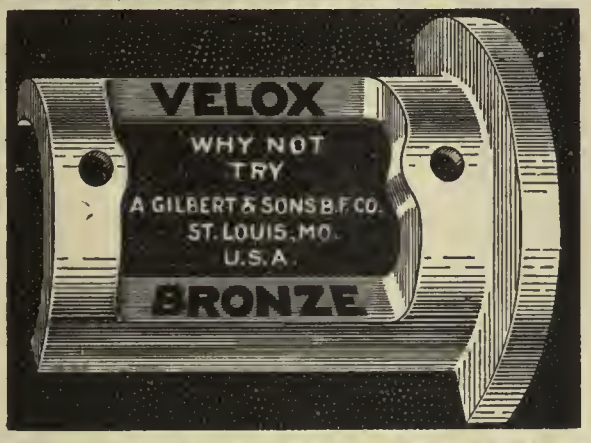


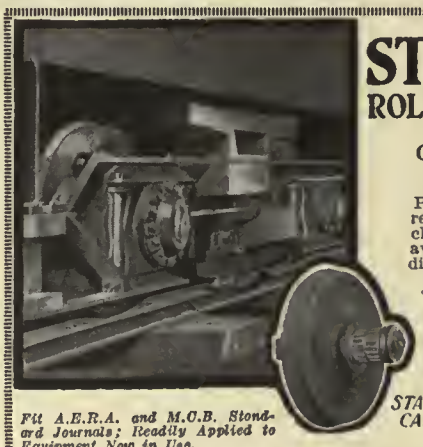
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Nichols-Lintern Co.

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Ramapo Ajax Corp.

Tampers, Tie
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Anderson Mfg. Co., A. & J. M.
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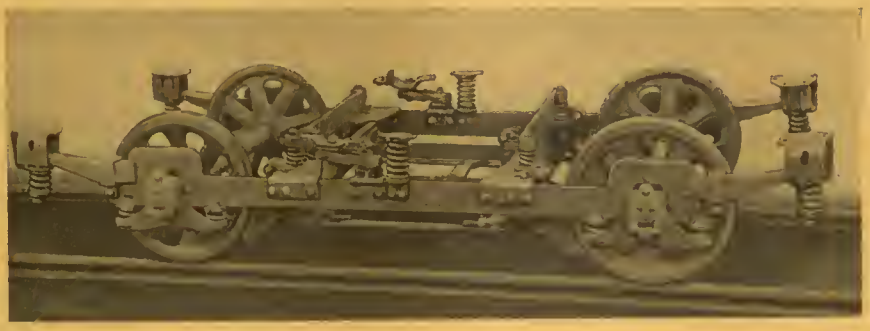
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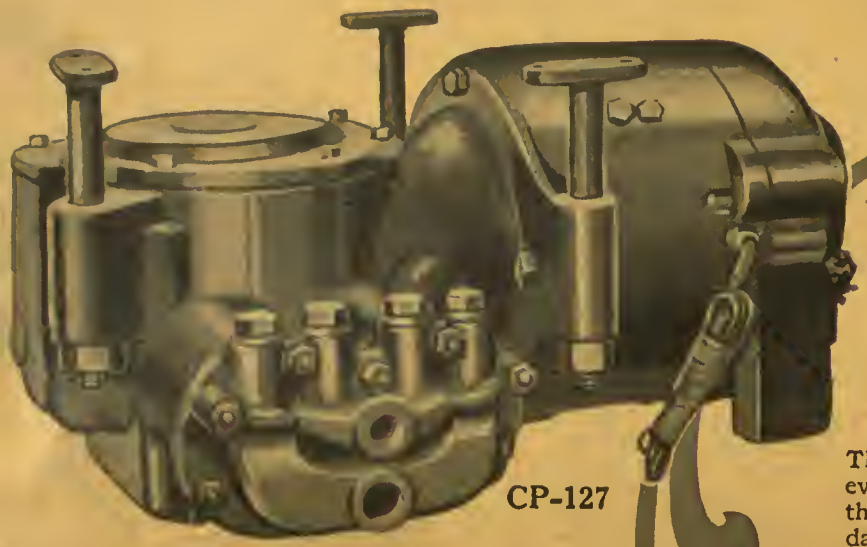
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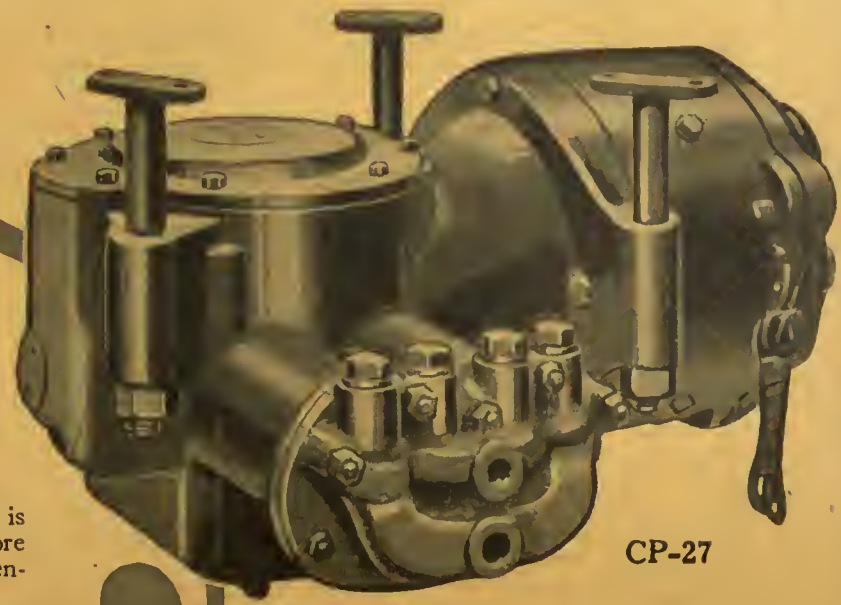
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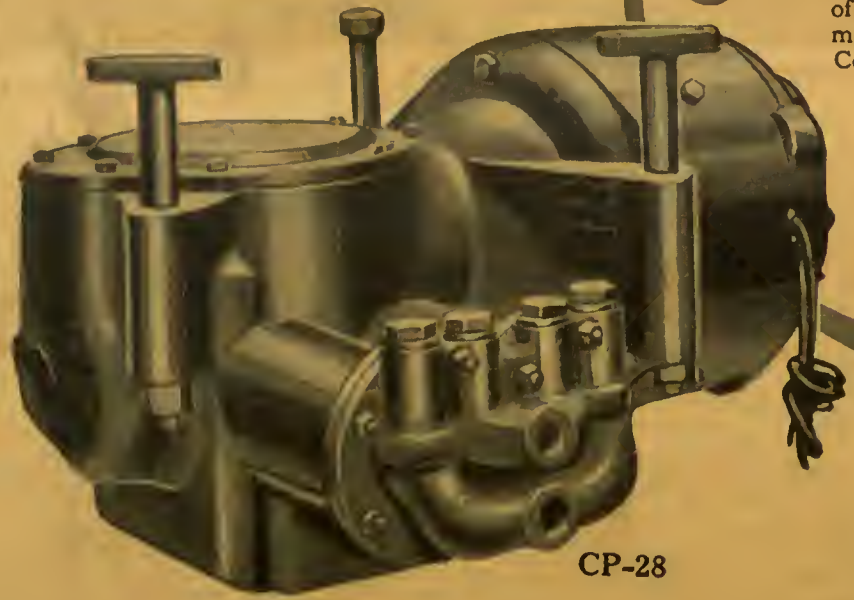
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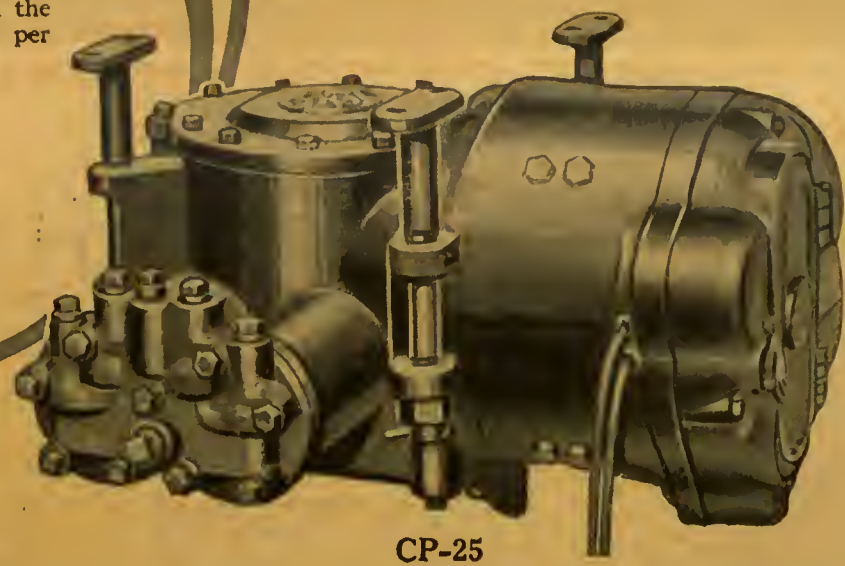
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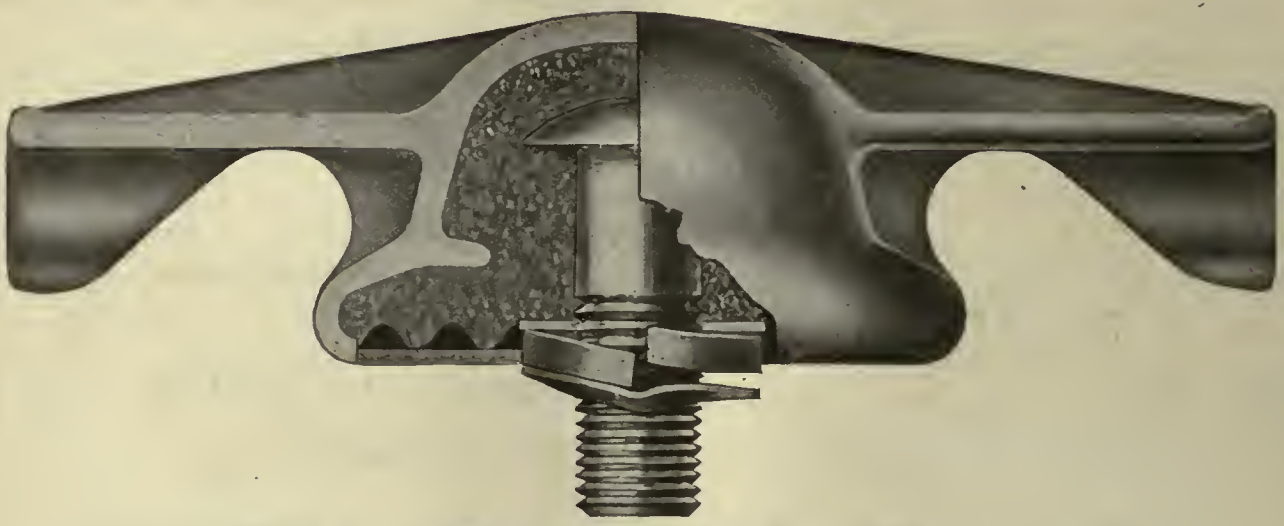
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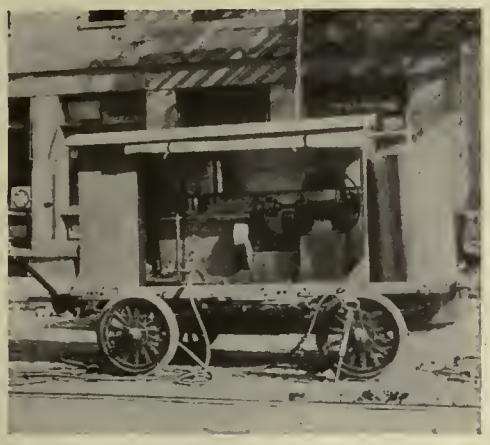
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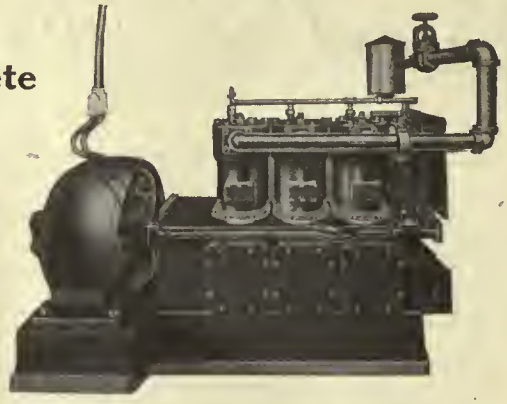
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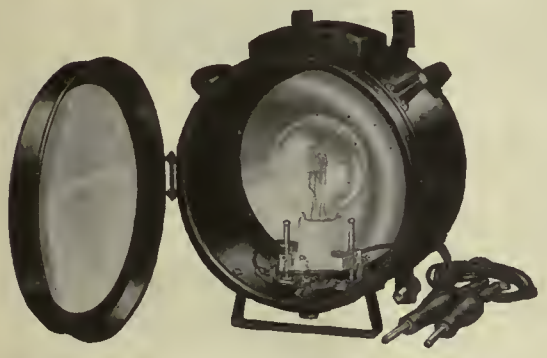
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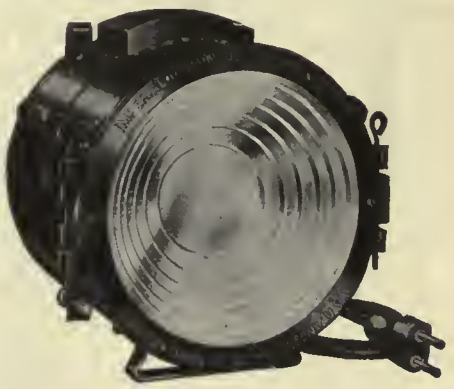
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The utilization of the concrete formerly wasted between and below wooden ties has in every case effected a large saving in construction materials. And this saving is at no sacrifice in quality because more effective bearing is provided, both on the concrete, and the subgrade than with wooden ties while the steel cross members serve to reinforce the foundation concrete.

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lowest cost bonding



ERICO BRAZED BONDS

are lower in purchase price than any other bonds, of like capacity, on the market. The additional cost of the necessary supplies for installing our Brazed Bond in only $.05 per bond.

The labor cost of installing the Brazed Bond is very low, our portable brazed bonding outfit requiring the services of only three men. 10 to 25 bonds can be installed per hour, depending on conditions.

We guarantee that when installed as we recommend, the terminals of our Brazed Bonds cannot become detached from the rail except by actual mutilation. Our guarantee insures you minimum maintenance costs.

ERICO offers the minimum bonding cost
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The Electric Railway Improvement Co.

Cleveland, Ohio



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—so your "salesmen" can talk—

Your cars are your salesmen. They must do the talking that sells all that you have to sell —car rides. Cars with indistinct destination and route markings are no better than dumb and blind salesmen.

Give them a chance to talk to your customers — actual and potential. Let them present your case with Keystone-Hunter Destination and Route Signs. Mr. Colby, the superintendent who specifies these signs for the Detroit cars (see illustration), hits the nail on the head when he says, "The value of a car as a revenue getter is in direct ratio with the effectiveness of its markings."

Shall we send you copies of the same data sheets we sent Mr. Colby?

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Manufacturer of Railway Material and Electrical Supplies

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Type LU



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Even after UNA Rail Bonds are installed they are all copper from rail to rail. Thus copper alone carries the current. This in itself is of great importance, as it makes power savings a maximum. There are, however, other important features of UNA Bonding.

The installation is not at all difficult. It is not necessary to grind the rails. The bond is simply placed in a mold against the rails. Then an electric arc is drawn. With this source of heat the bond strands are melted together with sufficient UNA Metal to fill the mold. Just as soon as the mold is full the bond is installed—a simple indication to the operator. By means of the UNA Metal the oxides and slag are removed from the rail, leaving clean steel to which the copper welds. The UNA Metal also produces a fine grain solid structure in the finished bond head. Under many tests the weld of copper to steel has proved so strong that 25,000 to 32,000 pounds are necessary to shear a bond head from the rail—and this shear always takes place through the bond head, leaving the weld of copper to steel undisturbed. These qualities are indicative of the long life of UNA Bonds.

UNA Bonds are also quickly installed. With a welding current from either a portable RWB Dynamotor or a resistance welder of ample capacity it requires only about 30 seconds to actually weld a 4/0 bond head to the rail. This makes the cost of UNA Bonding low, as a large number of bonds can be installed per day.

UNA Rail Bonds of standard capacities are available in both laminated and cable types. Let us send you a sample for your particular rail joint.

Rail Welding & Bonding Company
Cleveland, Ohio



Third rail bonding



Type CW. Also suitable for Weber Joints

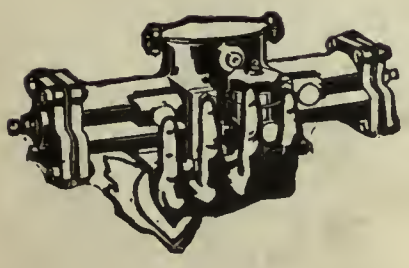


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Now it's one-man operation for the larger units.

Whether you are designing entirely new cars, or remodeling old ones for this new kind of service, you need proper equipment to make them entirely safe, and more speedy in operation. The most successful results are obtained by judicious selection from this list of modernizing, pneumatizing devices.



National Pneumatic

Door and Step Operating Mechanisms **Door and Step Control**
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Get in touch with us now for consultation on your rolling stock plans. Let us figure with you on NATIONAL PNEUMATIC EQUIPMENT.

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Loading in tilted position. Greatly reduced height for hand loading.

The track work season is near!

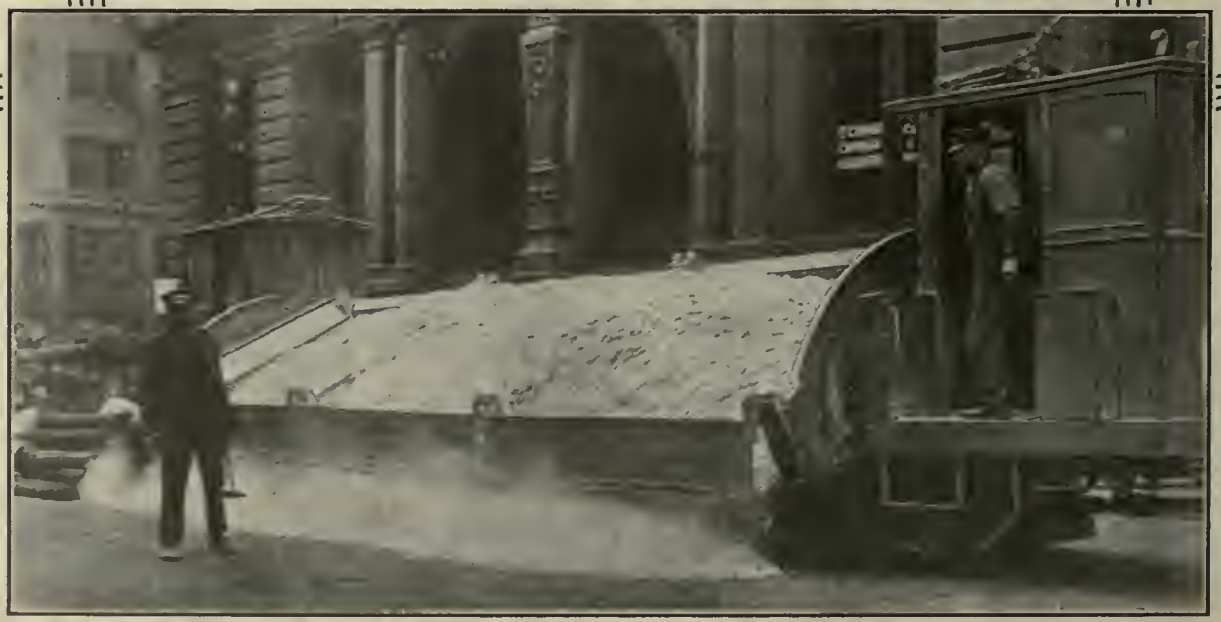
Differentials haul your ballast, concrete materials and ties, and dispose of your excavated materials at a fraction of the cost of any other method.

They place the load clear of the track—

You still have time to pay for Differentials with this season's savings if you order now.

The Differential Steel Car Company
Findlay, Ohio

Unloading in congested section of large city. Material placed clear of track. No interference with traffic.





I wonder what's the matter with the cars on this line. They used to run so quiet and smooth, and now they are just as noisy as they used to be. I thought they had these cars all equipped with Helical Gears.

They had, but all those cars have been shifted over to the Avenue line in order to give quiet service in the Hospital Zone. The people over there think every day is Sunday now, and the people on this line are doing the same old kicking about noisy cars. The Boss is promising them that he will put Nuttall Helical gears and pinions on all the cars as fast as he can; he says they have had a taste of them and won't be satisfied till they are changed; besides that he says he is satisfied the maintenance costs are reduced with Helicals.

MEMBER AERA 1923

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PITTSBURGH PENNSYLVANIA

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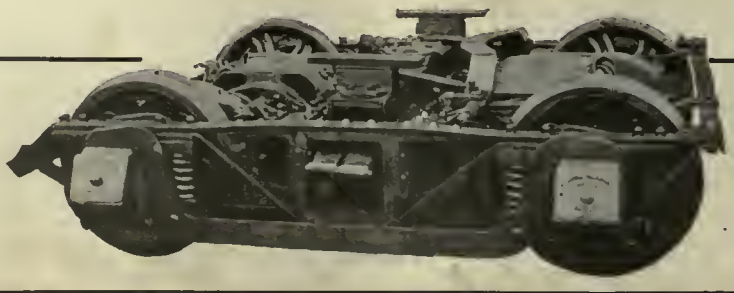
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Galena Oils are not ordinary refinery lubricants. They are made from selected stocks by our own special processes. Over a half century of experience in practical railway lubrication has contributed to their development.

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ELECTRIC RAILWAY JOURNAL

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Company, Inc.

HENRY W. BLAKE and HARRY L. BROWN, *Editors*

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New Interurban Provides a Service Demanded

IT HAS become a more or less popular indoor sport to predict the early demise of the interurban railway. Prophets sometimes think that motor trucks and buses will entirely replace this form of transportation. It is refreshing, therefore, to read reports of recent interurban construction, such as that of the new Dallas-Terrell interurban, which is given in this week's issue of the JOURNAL. It takes courage to invest some two millions of dollars in an enterprise like this. The fact that the promoters have faith in it is shown by the solid type of construction which has been adopted throughout. Many early interurban roads had grades as high as 5 or 6 per cent, but here is a line where the maximum grade, except for a short overpass, is restricted to 2 per cent. This is almost in line with steam railroad practice. The wisdom of it undoubtedly will be seen in low operating costs. Another interesting feature is the type of light-weight car adopted, the weight being lower than is customary for many city cars. This, also, should be conducive to economy. This design of car is quite appropriate on a 30-mile line.

A question that may be raised concerns the construction of a new road paralleling an existing steam railroad. Would it not have been better, from an economic standpoint, for the steam road to put up a trolley wire, and give the kind of service which the interurban now is furnishing? Even though the traffic on the steam road were such that additional trackage would be necessary, the total cost would be less than for the construction of an independent and competing line, and the financial results would be better. This instance is rather typical of the lack of aggressiveness that has always existed on the part of the steam railroads in territories where better local service is demanded by the public.

Taxation Is a Problem of Serious Import to Utilities

IT IS a basic principle of government that it must be supported by its citizens. It is only in a state such as Monaco, with its world-famous Monte Carlo, that others can be induced to finance it. The principle of taxation is just as old as organized government itself. Taxation is either direct or indirect, depending upon whether the citizens pay directly to the government or through some collecting agency. Utility taxation is in this latter classification. So long as the public can be induced to pay, this is a fairly efficient means of collecting revenues for the support of the government. But when the government gets more than the owners of the property, it becomes a question as to whether this is the correct method of collecting taxes. For instance, in a study made of taxation in New York State, it was shown that fifty-six electric railways paid over half of their net incomes for taxes to the State of New York and to localities within the State.

State Senator Frederick M. Davenport of New York is a deep student of the problem of utility taxation. The report of his committee to the National Tax Association, abstracted in this week's issue, takes up utility taxation in its broader national aspect. The principle of basing taxes on ability to pay is entirely logical and can be questioned by few. The method proposed, consisting of a graduated tax on gross and net incomes, seems to be a satisfactory general solution of the problem. By properly adjusting the rate the burden may be made to correspond in fairness with the property tax of other taxpayers, remembering, of course, that much intangible property, and also a good deal of tangible property, escapes under the general property tax. A thorough understanding of the utility taxation problem, such as that given in Senator Davenport's analysis, will do much toward improving the relations of the utilities and the public that they serve.

Electrolysis Situation Is Clearing

READERS of this paper will appreciate the explanation of the fundamentals of stray current distribution which are given in an article by E. R. Shepard, published elsewhere in this issue. Recent researches made with the earth-current meter have made possible the statement of these fundamentals in a way which was not possible earlier; hence the present timeliness of this article. The author is qualified to state the modern concept of the subject because for many years he has been devoting his time and thought to research in this field.

Much of the misunderstanding regarding the corrosion of underground pipes, caused, or alleged to be caused, by electric railway currents, has been due to ignorance as to what actually goes on in the soil. Pipes corroded and electric railways were in the vicinity, hence, argued the owners of the pipes, the burden of proof was upon the railways to show that they did not cause the damage. This was difficult to do, and in many cases the proof was impossible because the facts were against the railways. However, the mysterious character of the return circuit made any kind of convincing proof difficult to produce.

Fortunately, the electrolysis muddle is clearing up. The American Committee on Electrolysis is proceeding systematically, although deliberately, to formulate the knowledge which is available on the subject. Electric railways are getting their return circuits into better shape so as to minimize the escape of return current. Pipe owning interests are coming to see that they have responsibility in the matter. The possibilities and

extent of corrosion without stray current are increasingly appreciated. Investigations are constantly under way for the purpose of determining the facts, which means that ultimately the procedure to be followed in protecting buried structure will be fairly well standardized.

When the Bus Will Replace the Urban Railway

SO MUCH idle talk is getting into the newspapers these days about the coming replacement of the street railway by the motor bus that it behooves the industry to see to it that the general public is given information that is more substantial, so that it may have the basis to think for itself and not merely follow the leadership of these over-night transportation experts. We may expect the bus to replace the railway when the total cost of service is less, when it will cause less street congestion, when it will carry the people faster, when it will provide greater comfort, when it can provide more dependable service or greater safety. In how many of these requisites does the bus surpass the railway?

No one yet has demonstrated that the motor bus can be operated to supply regular all-day service for less total cost per seat furnished than the electric railway, except where traffic is light. In fact, the higher cost of one-man bus service as compared to one-man single-truck safety car service is shown in practically every bonafide statement of operating costs, in spite of the very great excess of investment necessary in the railway.

As to its value in reducing congestion, H. A. Littledale, writing in the New York *Evening Post* on New York City traffic congestion, recently attributed New York's congestion primarily to the presence of street cars. No doubt these street cars do add to congestion, but Mr. Littledale neglected to give his readers any information as to how the substitution of buses would solve this problem. While the ability of the bus to load and unload at the curb and pass traffic obstructions which delay rail service is an advantage, he failed to show that, to transport the equivalent number of passengers, each street car would have to be replaced with three single-deck buses. The principal point of traffic delay is at the street intersections. Common sense would tell any one that to multiply by three the number of vehicles necessary to carry the passengers in each direction across an intersection would greatly increase the congestion rather than ease it.

Nor is it demonstrated, after considerable experience, that buses can provide a faster service than street cars. Under equivalent traffic conditions, the street car is able to make a little faster schedule than the motor bus because with modern railway equipment, as against the modern bus, the street car can accelerate faster than the motor bus, and its free running speed is at least equivalent. It may be admitted, however, that Manhattan street cars are hardly a fair sample of modern railway equipment.

On the point of comfort, however uncomfortable a street car may be with the crowding of its space that must be tolerated, there is only one basis on which the motor bus can possibly be considered more comfortable and that is when the loading is limited to a seat for every passenger—a condition which it would be impossible to meet if the motor bus were the only means of transportation available. With the loading that must be permitted under city conditions, and with the narrower aisle and smaller dimensioning generally of the bus, this matter of greater comfort popularly attributed to the bus is largely an illusion. It has come out in several instances that where the people have at first been very enthusiastic about bus service, they have later with experience been disappointed and have turned their attention back to the street car.

There has not yet been sufficient experience to determine that the motor bus is more or less dependable than the street car, but it may be said that the motor bus will have to "go some" to equal the record commonly established by the street car. And taking into account the influence of weather conditions throughout the year, one would be safer to stake his wager of dependability on the tried and proved trolley car.

On the element of safety, it is again hard to find wherein the motor bus can possibly excel the street car, from the point of view of the passenger. Any one who has driven an automobile knows with what risk a rubber-tired vehicle is handled when pavements are wet or icy. In addition to uncertain traction, there is the hazard which the railway does not have of holes and humps in the pavement. Then there is the dangerous operation on hills, from which, it is feared, we shall have to go through a course of serious accidents before the safety of the motor bus mechanism can be considered on a par with that of the street car.

All of this is not losing sight of the fact that the bus has its place, as has been repeatedly pointed out in these columns.

The "Journal" Is an Independent Institution

INSTANCES occur, seemingly more frequent of late, in which persons not very familiar with the ELECTRIC RAILWAY JOURNAL or the American Electric Railway Association confuse them to the extent that they consider that the American Electric Railway Association publishes the ELECTRIC RAILWAY JOURNAL. Close association of the two institutions in the minds of some may not be surprising. Both were started about the same time, and as the primary purpose of both has always been to help the electric railway industry by the exchange of information, though in different ways, their relations have always been close and friendly. Nevertheless, it is distinctly to the benefit of the industry that there is such a publication as the ELECTRIC RAILWAY JOURNAL which is completely independent of the association.

One reason for this is that the detached position of the magazine gives it, if not a broader outlook at least a different one, and permits it to take a more advanced position in some directions than the association would be warranted in doing. Again, as the JOURNAL'S subscribers include many foreign roads and many persons entirely outside of the industry, as well as many railway men not members of the association, its clientele is very much larger than the association would want to include in its membership. In consequence, the strength of these outside groups is added to the forces aiding in the development of the industry. The ELECTRIC RAILWAY JOURNAL gains and the industry gains from the fact that as an enterprise the JOURNAL is quite apart from the American Electric Railway Association.

Northern Texas Has New Interurban*

Texas Interurban Railway's Dallas-Terrell Line Most Recent Example of Interurban Construction—Methods, Materials and Equipment Described—Automatic Substations and Light-Weight One-Man Cars Are Features

By Sam R. Fowler
Superintendent of Construction Texas Construction Company



Closing the Last Gap in the Roadbed Grading

DUE to various economic considerations interurban development has been dormant for several years. The Dallas-Terrell interurban line, opened on Jan. 14, is one of the few examples of recent construction. This road was projected more than ten years ago, and preliminary work was done by the Stone & Webster Engineering Corporation in 1912-1913, the writer making the preliminary surveys, final location and reports. Financial considerations in 1914 caused the temporary abandonment of the project.

In connection with the new franchise granted the Dallas Railway in 1917 by the city of Dallas, it was agreed that the owners would construct certain interurban railways, among which was this one. Although thus assured, financial arrangements were not completed until early in 1921.

The route parallels the Texas & Pacific Railroad practically all the way. It is nearly due east for 31.5 miles from Dallas to Mesquite, Forney and Terrell, with populations respectively of 1,000, 1,500 and 12,000. Including these the tributary area has an estimated average population of 1,200 per mile of line. The territory consists mainly of fertile farms in the black land belt, similar to that traversed by the four other interurban lines centering in Dallas. The original route was followed, except for necessary relocations through Mesquite, Forney and Terrell, caused by improvements in these towns.

An hourly passenger service is maintained with a running time of one hour and twenty minutes with a ten-minute layover at each terminal. Two express trains are run each way daily. At Terrell the Texas Interurban Railway has arranged close connections with the Texas Midland Railroad, a north and south steam road, so that its passenger trains use the interurban depot. Both the Texas Midland Railroad and Texas Interurban Railway sell through tickets to points on the other road at short-line rates. They also have co-operative advertisement service. The Texas Midland Railroad has accommodated its schedules to the new interurban line and soon will operate gasoline motor cars with greater frequency than is possible at present with steam equipment. Ultimate plans contemplate the electrification of the Texas Midland Railroad.

The Texas Construction Company was organized to build and equip the line, with Richard Meriwether as vice-president and general manager. B. R. Brown, chief engineer, had supervision over all designing, purchasing and construction of the line. The writer, as superintendent of construction, had charge of all construction work. W. R. Burns, assistant secretary and treasurer, handled the financial matters. B. Frank Cooke superintended the building of substations and installation of electrical equipment. H. N. Clagett and B. H. Hart were resident engineers.

A ruling grade of 2 per cent was maintained. The only variations in excess of this grade are the approaches to an overpass of a steam road and to follow the existing grades of streets traversed. This necessitated some short 3 per cent grades. The maximum degree of curvature in high-speed territory is 3 deg. In the 26 miles not included in the limits of incorporated towns there are but 116 deg. of curvature. The total curvature in the 29.3 miles constructed is 490 deg. Actual surveys of drainage areas were made where they were less than 500 acres. Talbot's formula was used for determining the size of waterways. The track outside the corporate limits of the towns served

*A brief description of this line was included in the report of its opening in the ELECTRIC RAILWAY JOURNAL for Feb. 3, 1923, page 218.

is on private right-of-way 100 ft. wide, with additional width where required.

Roadbed Grading and Trestling

During the several months required for preparing and acquiring the right-of-way deeds, 2 miles of the grading was done by a small outfit. On Nov. 1, 1921, a general contracting firm began the grading, trestle bridging and drain pipe laying. On March 1 following, 95 per cent of the distance and 90 per cent of the roadbed was complete. In moving the 194,000 cu.yd. of excavation and 306,000 cu.yd. of borrow, nearly every kind of grading apparatus was used, including slips, fresnoes, Western wheelers, Maney wheelers, elevating graders and steam shovel with wagons and a dragline.

The minimum width of roadbed excavations was 26 ft., and slopes one and one-half to one. Embankments up to 20 ft. in height have an 18-ft. crown. For each additional 5 ft. in height the crown was made 2 ft. wider. Embankments made with wagons were carried out in 6-ft. layers. A 10-ft. embankment through bottom lands was built with a dragline shovel in three layers, each lift being thoroughly rolled with a 10-ton roller. Several heavy rains and a 6-ft. overflow have done this part of the embankment no serious damage. No material was wasted from excavation, overhaul being paid on it to adjacent embankments.

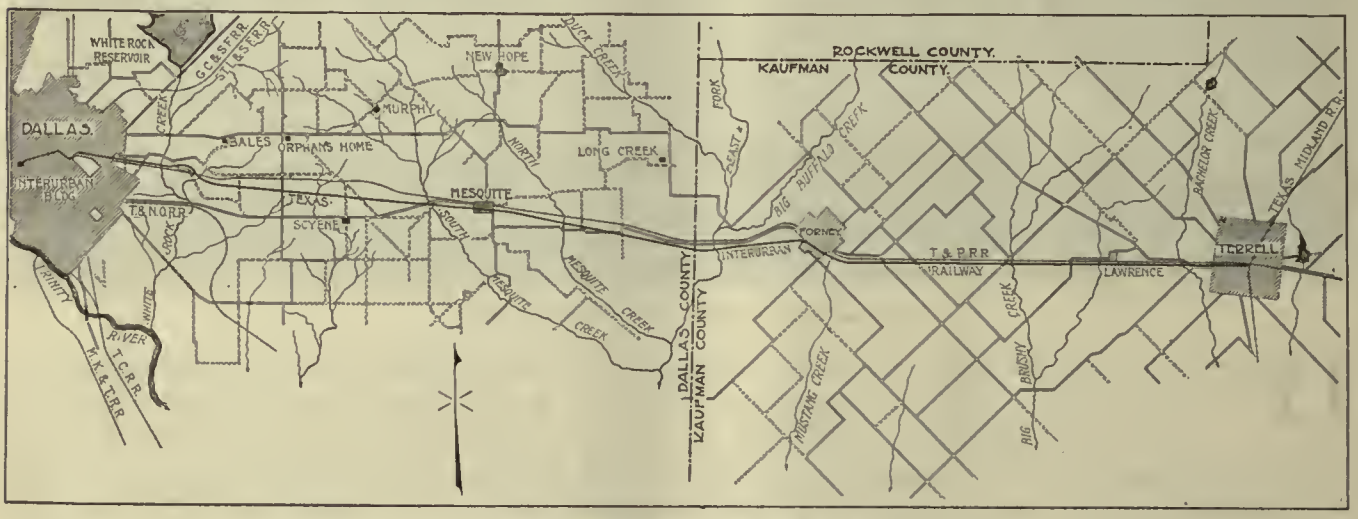
It required 2,940 lin.ft. of reinforced concrete pipe of 24 to 48 in. diameter to care for the small drainage through the roadbed. One 6-ft. x 7-ft. reinforced concrete box, 143 ft. long, was constructed. Galvanized, corrugated cast-iron pipe, 18 in. to 30 in. in diameter, was used under road crossing ramps, etc., 1,600 ft. being required.

There are 4,886 lin.ft. of trestle on the line. Bents are at 14-ft. centers having four long-leaf yellow pine piles (12-in. butts), and averaging 12-ft. penetration. The piles had 12-lb. full-cell treatment, the creosote oil being applied at about 190 deg. F. A final vacuum was applied for cleaning the surface of the piling. Where penetration could not be obtained concrete footings and 12-in. x 12-in. posts were substituted. Two-ply chords were used in the deck, and ties spaced with 16-in. centers. All decking was of untreated 90 per cent long-leaf yellow pine.

The three steel structures were designed for Cooper's E-30 loading. This construction work started on Nov. 1 and was completed in four months. The substructures contain 465 cu.yd. of reinforced concrete, and the superstructures weigh a total of 189,000 lb. One 85-ft. pony truss on reinforced concrete piers spans the east fork of the Trinity River. One span of 52-ft. through girders on reinforced concrete abutments overpasses the Dixie Highway. The railroad overpass consists of three spans. Fifty-two-feet through girders on steel pedestals and concrete footings clear the tracks and the approaches consist of 35-ft. deck girders spanning to reinforced concrete abutments.

Track Laying and Ballasting

Trackwork started on Aug. 1, 1922, and ballasting two weeks later. The rail, of 70-lb. A.S.C.E. section, was laid with $\frac{7}{8}$-in. x 5½-in. spikes, standard four-hole 24-in. angle bars, and $\frac{3}{4}$-in. x 3¾-in. Harvey grip bolts. Untreated white oak 6-in. x 8-in. x 8-ft. ties spaced at 24-in. centers were used. All curves were tie plated with Sellers type "G," 6-in. x 8-in. x $\frac{3}{8}$-in. anchor-bottom tie plates. The outer rail was elevated on curves for a car velocity of 35 m.p.h.

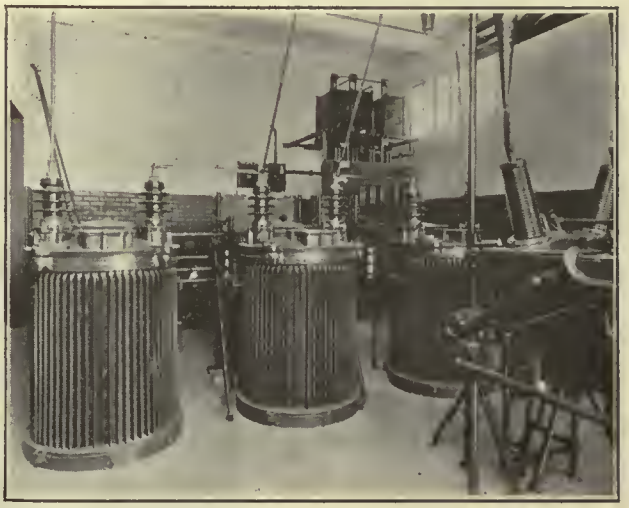


Route of New Texas Interurban Railway

In carrying out the construction work on the track and overhead, two widely different methods were used. One was to build the track first and then do the trolley work, the other to build the overhead and follow with the track laying. Steam locomotives and flat cars were used in laying 19 miles of track extending west from Terrell. The cars of rail were carried in front of the engine and the tie cars behind. Three wagons were used to haul the ties ahead. A mule on each side, with a short chain and snatch hook attached to its single-tree, dragged forward the rail as it was thrown off the cars. With a gang of thirty-five men, an average of 530 ft. per hour was laid, half tied and quarter spiked. Full tying, spiking and lining were kept within a mile of the end of the track.

The remaining portion was laid with two-car electric work trains out of Dallas. The ties were carried ahead on the flat car and the rail on the motor car. Specially-constructed work cars were built in the Dallas Railway shops for this purpose. The motorman's cab was at the center of the car and elevated 15 in. above the floor to permit stacking the steel on the car. The ties were carried ahead by hand and mules dragged the rail, as in the other instance. This method, using thirty-eight





At Left, Type of Building Construction Used for Automatic Substations. At Right, Mesquite Substation Layout

men nine hours per day, averaged 1,584 ft. full tied, spiked and lined per day.

Ballast for the eastern 14 miles was hauled from Terrell by steam engines in center-dump ballast cars, averaging twelve carloads per day. The gravel ran about 60 per cent aggregate with very little clay, 1,850 cu.yd. being used per mile to make a 6-in. raise. Ballast for the remaining portion was hauled from Dallas by three electric Differential, side-dumping cars, averaging four trips each per day. This gravel ran about 50 per cent aggregate, 35 per cent sand and 15 per cent clay. The same amount of this was used for a 6-in. raise. A Doone scraper (go-devil), attached by a cable to a small street car, pulled the ballast into the center of the track.

In addition to the 29.3 miles of first main track, 1.13 miles of second main track, three sidings, three wyes and three spurs were laid. In Dallas ¾ mile of the double track is in hard surface paving, with concrete base. On private right-of-way the main-line track occupies double-track position, the pole lead being on the center line of the right-of-way.

Power for the line is furnished by three substations, one of which, located in the city of Dallas, is manually operated. The two others are automatically operated and are located 14 miles and 27 miles from Dallas. A 300,000-circ.mil feeder and No. 0000 grooved trolley are used as conductors. The substation equipment was furnished by the General Electric Company. The automatic stations are supplied with power at 22 kv. from the high-tension line of the Texas Power & Light Company serving this territory. This voltage is stepped down to 445 through three single-phase transformers and is converted into direct current by means of a 300-kw. synchronous converter.

In addition to the power transformers and converters, each station is equipped with a.c. and d.c. arresters for lightning protection, one 5-kva. control power transformer, instrument transformers and automatic switching equipment for performing the starting and stopping operations ordinarily done by the station operator in manually-operated stations. Various protective devices safeguard the station against damage by abnormal conditions or irregularities occurring on the system or within the station.

The Ohio Brass Company furnished the line material for the overhead system, which is of the catenary type with five-point suspension, supported by single poles set 7 ft. deep and spaced 150 ft., except around curves and in streets, where double-pole direct suspension is used. Pole spacing in streets was reduced to 100 ft. Lightning arresters, feed-in taps and ground taps were placed six per mile.

Long-leaf yellow pine 35-ft. poles, 7 in. to 8 in. tips, gained and roofed before being creosoted, were used in the lead. All poles were treated by the Lowry



Work Car and Trailer Used in Line and Track Construction

Track and Overhead Construction Texas Interurban Railway

No. 1—Arrangement of catenary in passing from curved to tangent track.

No. 2 — Typical track and trolley construction on curve showing heavy fill.

No. 3—Overpass of T. & P. Railroad near Dallas.

No. 4 — Overhead construction at siding.

No. 5—How catenary is carried under public road overpass.















At Left, Station at Terrell, Tex. At Right, Typical Wayside Waiting Shelter

process using English oil (grade No. 1, American Wood Preservers' Association) with specific gravity of 1.03. The 30-ft. poles used for stubs and span construction were made by cutting 5 ft. off the ends of stock poles. Where this was done, the cut surface was treated with creosote preparation applied cold.

The 5-ft. ends cut from stub poles were used for back-guying at storm guys, which were placed every half mile on tangents and at each end of curves. Special curve hangers were used by stringing the messenger sufficiently outside the center line of the curved track to hold the trolley to the proper position. By bringing the messenger back to true line at the strain plate in the storm guy at each end of the curves the trolley was held in proper alignment. The trolley was made "hot" as each mile or so was completed.

All rail joints were bonded with No. 0000, Type A. W., Form 2 arc-weld bonds. At all feed-in taps No. 0000, Type A. W., Form 3 cross bonds were used. Two portable electric welders were operated by the day shift and two heavier ones, mounted one on each end of a work car, bonded at night.

On the eastern half of the line, the pole gang of eighteen men used a gasoline motor car and trailer for transportation. Three days were devoted to hole digging, and poles were set every fourth day with a steam train and derrick. This required but half of the day and averaged eighty poles. Gravel for tamping the poles, which was done on the same day, was taken from the track ballast as it had not been dressed off. Bracket arms were placed, messenger, trolley and feeder were strung and pulled with the steam train by a gang of six linemen and a foreman. They averaged 0.8 mile per day for the 17 miles built in this way.

On the western portion of the line, the gangs and tools were carried out of and into Dallas by trucks. All poles and fixtures, gravel and wires were hauled and placed by trucks, excepting the feeder, which was strung with a line car after the track was laid. The pole gang on this end of the line, consisting of fifteen men and a truck, erected 480 poles in forty-one working days.

Two metallic-return telephone lines were strung on the same crossarms with the feeder. A single pin on the track side of the pole carries the feeder, and pins on the outside carry the four telephone wires. Transposition pins occur every 1,000 ft. Under normal conditions one circuit cares for dispatching and other com-



One-Man, 30,000-Lb. Car Used by New Texas Line. Inset, Comfortable Seats, Wide Aisle and Observation Compartment Are Features of the Interior

mercial business. These two lines are arranged at all telephones, with the necessary two-way knife switches, so that in case of trouble on a circuit any section of either line can be cut out and the other circuit used in dual service. At passing tracks and substations, 4-ft. x 4-ft. telephone booths are provided.

Depots and Waiting Sections

Brick veneer depots were built at the principal stations. Those at Mesquite and Forney are 20 ft. x 32 ft. and that at Terrell is 20 ft. x 64 ft. Track wyes are provided to serve the express room. At Dallas the line uses the joint interurban passenger and express terminals in common with the other interurban roads.

Shelters have been placed at seventeen public road crossings. They are 6 ft. x 10 ft., with one open side.

Rolling Stock

The rolling stock consists of five passenger cars and two express cars, which were designed under the personal supervision of J. L. Brown, master mechanic of the Dallas Railway, and built by the American Car Company. These cars are 45 ft. in length and 8 ft. 6 in. in width over all. They are mounted on Brill 77-E trucks at 25-ft. centers. They are equipped with 26-in. rolled steel wheels, having 3-in. treads and 1⅛ in. flanges, ⅛ in. high. The equipment consists of four 35-hp. G. E. 265 motors, with K-35-G2 controllers, Electric Service Supplies Company's compensating lighting fixtures, and 150-watt headlights of the Golden Glow type, with dimming device. The cars are painted medium Malori green, with ivory finish.

The passenger cars are of the one-man type. A door in the rear vestibule permits a car to be used as a two-man car when traffic requires. The doors are of the sliding type, operated pneumatically. The cars seat fifty-four passengers, having 37-in. seats upholstered in green plush and a 27-in. aisle. Grab handles are of aluminum to avoid hand sweating and tarnishing. The cars complete weigh 30,000 lb.

One two-car work train, with a tower for line work, and two Buda No. 19-L air-cooled gasoline motor cars are provided for section work. This equipment also was used in the construction work.

No shops or carhouse facilities have been provided, as the cars will be cared for at the carhouses and shops of the Dallas Railway, which has ample facilities for handling the work.

Some New Light on Electrolysis

Earth Potential Gradients Main Factor in Determining Electrolysis—Many of the Assumptions Heretofore Made in Regard to the Flow of Currents in Pipes Are Erroneous—The Earth Current Meter Has Yielded Data of Great Value

By E. R. Shepard

Consulting Electrical Engineer, Chicago; formerly Electrical Engineer United States Bureau of Standards

THERE are few technical problems in which the interpretation of experimental data is so baffling and difficult of analysis, and in which a proper sense of judgment and proportion is so necessary, as that of stray current electrolysis. This is not because stray currents fail to obey the ordinary and well-known laws relating to the flow of electric currents, but rather because of the difficulty in obtaining a proper sense of proportions of the numerous variable factors involved. In the first place, in dealing with stray earth currents we are concerned with a secondary or residual effect, the major portion of the current, as a rule, being returned on the rail circuit. Moreover, the shunt path over which stray currents flow is a most complicated one, including underground structures in various ramifications as well as the limitless earth with its water courses and geologic variations. With this complex circuit involving variable and unknown resistances and relations, it is not surprising that great difficulty is often encountered in determining the course and effects of stray currents.

Potential Difference Data

Potential difference measurements between underground piping systems and adjacent electric railway tracks have long been used to indicate electrolysis conditions, although practically all engineers have known that such measurements do not afford a reliable criterion as to the actual hazard to which the pipes are exposed. The need for a better method of determining electrolysis conditions has long been recognized and led to the recent development of the earth current meter by the Bureau of Standards, an instrument which measures the current density in the earth rather than potential differences between structures.

The limitations of potential difference measurements as an electrolysis criterion have been ascribed largely to varying earth and roadbed resistance and vaguely to "other local conditions." Earth resistivity undoubtedly is an important factor, but there are other factors which are thought to be of even more importance. It is the object of this article to discuss these and, if possible, to modify or clarify the prevailing conceptions regarding the flow of earth currents in such a manner as will be helpful to those who are interested in this branch of engineering and research. The conception here presented is largely the result of a careful analysis of recent intensive studies with the earth current meter, supported by previous observations and experiences in the field.

Usual Methods of Representing Stray Currents Misleading

The usual elementary explanation of stray current electrolysis as set forth in the report of the American Committee on Electrolysis and numerous papers and articles includes a diagram similar to Fig. 1. which shows current leaving the tracks and flowing to the pipes in areas remote from the supply station, and after being transmitted along the pipe through the neutral area, discharging to the rails in the vicinity of the supply station.

This diagram, while not altogether incorrect, gives a false and exaggerated idea of the extent to which pipes as a rule transmit stray currents. Such a condition as thus graphically depicted may prevail under special or exceptional conditions as, for example, where a welded steel main or other low-resistance and continuous conductor in direct contact with the earth parallels an electric railway for a considerable distance and has few or no laterals or services. Under simple conditions of this kind, the pipe will perform in accordance with the usual diagrams and explanations, and current collection or discharge at any point will be approximately proportional to the magnitude of the potential difference between the pipe and the track.

The usual condition, however, is quite different, involving pipe networks, either continuous or discontinuous, with many services and laterals, and is so different from the simple example just cited that the usual explanation fails utterly to account for following commonly observed phenomena:

Electrolysis Anomalies

1. Attempts to locate currents on pipes in neutral or positive areas almost invariably meet with negative or insignificant results unless the pipes are metallically bonded to the railway return circuit. It is a matter of frequent comment and experience that pipe currents of magnitude are not found where they logically should be expected.

2. Severe electrolytic damage is often observed on service pipes crossing under electric railway tracks where no appreciable damage has occurred on the main, although the main may be positive to the rails.

3. Earth current measurements often reveal a discharge from mains strongly biased toward parallel electric railways, that is, when the angle between the pipe and the track approaches 45 deg. In many instances such mains have been found to be collecting current on one side and discharging on the opposite side, although potential difference measurements show them to be strongly positive to the track. An example of this kind was observed in New Orleans in 1922, and is illustrated in Fig. 2. A 6-in. castiron main 3 ft. deep and paralleling an electric railway track at a distance of about 4 ft. was 1.65 volts positive to the track. The main was uncovered and the end of the trench squared up. A polar diagram of current discharge was obtained by



Fig. 1—Common but Misleading Method of Representing Stray Currents

taking readings at 15 deg. intervals with the nonpolarizing electrodes and the earth current meter. The main was found to be collecting current on one side and discharging it toward the track on the other side. The current density at different points is shown in the diagram in milliamperes per square foot of pipe surface. This condition is typical of many other observations made on pipes paralleling electric lines.

An extreme and striking case has recently developed in which a cast-iron main, 7 ft. from a track and positive to it by about 4 volts, was found by the earth current meter to be collecting current. The main was in good condition, but the services which extended under the track were badly corroded and were found to be discharging heavily.

In attempting to explain these various phenomena, it will be necessary to present certain ideas which, though not contrary to usual conceptions, may be stated in such

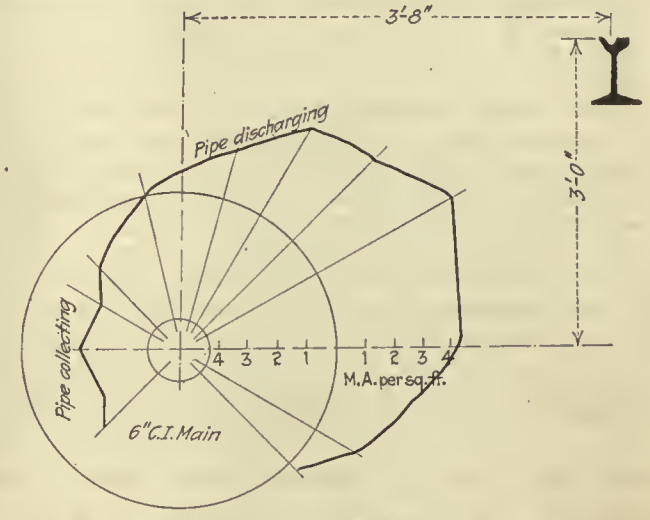


Fig. 2—Polar Earth Current Diagram Showing Transverse Electrolysis. Pipe 1.65 Volts Positive to Track

a way as to seem at variance with them. The ideas which it is desired to present are but partially and inadequately embodied in the following statements:

Lateral Versus Transverse Potential Gradients Responsible for Electrolysis

1. Lateral, as against longitudinal, potential gradients in the earth are directly responsible for stray current electrolysis.

2. The function of underground structures in the longitudinal transmission of stray currents is small and almost negligible in comparison with the part played by the earth, unless such structures are electrically drained to the railway return circuit.

3. Piping systems in general assume the average potential of the earth in which they are buried and limited portions of such systems should be considered as equipotential bodies and not subject to the same potential gradients that exist in the earth.

4. Potential gradients in the earth are in general very much smaller in a direction parallel to street railway tracks than at right angles to them.

5. The familiar over-all voltage curves showing the potentials of tracks, earth and pipes are misleading, as such potential profiles cannot be made to apply to the earth as a mass nor to the structures as a network without rigid qualifications. Such profiles are applicable only to line conductors such as a wire or an electric railway line.

The significance of these statements will be better understood by the following explanations and illustrations:

Consider an electric railway line for which the overall potential curve is shown as *A* in Fig. 3. Because of the fall of potential along the track, current will leave the rails in the area remote from the supply stations and return to them near the supply stations as indicated by the arrows *B* and *C*. The stray currents in the earth will in general assume long, sweeping stream lines which

will be substantially perpendicular to the track for a considerable distance and which will reach great distances before they again converge to return to the track. The potential gradients in the earth will, therefore, be steep in a direction perpendicular to the tracks and slight in a direction parallel to the tracks. Another way of expressing this idea is by saying that most of the over-all potential drop through the earth is consumed in discharging the current at one end of the line and collecting it on the other end and relatively little in transmitting the current longitudinally through the earth.

The potential gradient curves in the earth in a direction perpendicular to the tracks at the two ends of the line are shown as *D* and *E*. The curve *D* is drawn from the extremity of the over-all track potential curve which represents the potential of the rail at that point. It is steep, close to the track, and becomes almost horizontal at a remote location. The curve *E* at the supply station is even more steep and rises to almost the same level as that assumed by *D*. The distances from the tracks at which such curves will become practically flat will depend upon the earth and roadbed resistances, but in general there will be very little change in earth potential at distances greater than 200 to 300 ft. from the track. This means that the over-all potential drop

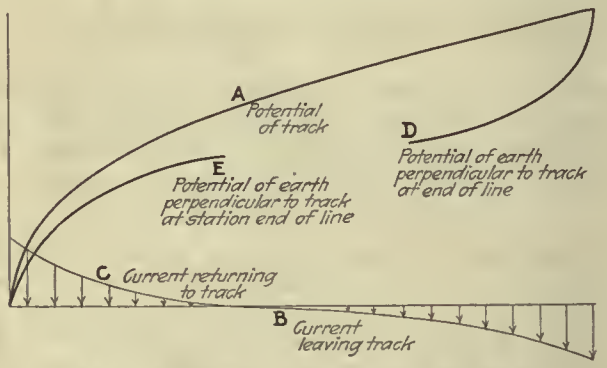


Fig. 3—Potential Curves of Track and Earth

in the earth will be very small if the reference points are taken several hundred feet from the two ends of the railway line in question. It follows, therefore, that pipe networks through which electric railway lines extend will have but little tendency to transmit current from one region to another, although high local gradients may exist on them in a direction perpendicular to the track, causing local currents and consequent collection and discharge of current at different points.

The difficulty of attempting to draw a curve to represent the potential of the earth at various points along the track is at once obvious when it is seen that the form of such a curve would depend entirely upon the distance from the track of the reference line.

Electrolysis Conditions in Different Forms of Pipe Networks

Various conditions which obtain in practice will be discussed with reference to the possibility of stray current electrolysis.

In Fig. 4 is shown a potential gradient curve in the positive area which represents the potential of the earth at the depth of the pipes, say 4 ft., and in a direction perpendicular to the tracks. The base line to which it is referred is the track potential at that point. Consider a very small piece of iron, or other metal, *A*, buried in the earth. It will assume the potential of the earth at that point and will neither collect nor discharge current. A metal bar placed horizontally in the earth will be an equipotential body or nearly so and will, therefore, assume the average potential of the earth in which it lies as shown at *B*. One end of such a bar will collect current and the other end will discharge it, the magnitude of the current depending upon the length of the bar and the steepness of the gradient in the earth.

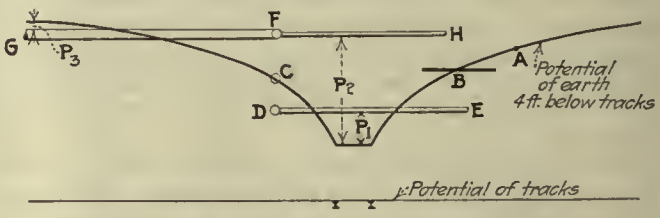


Fig. 4—Positive Area Near Power Supply Station

A sphere or a cylinder of appreciable size, as for example a pipe, will assume a potential as shown at *C* and will be subjected to slight transverse electrolysis. That is, it will collect current on one side and discharge it on the other. This condition prevails in the case of a main paralleling an electric railway and having but few services or laterals. However, if such a main line is close to the track and parallels it for a considerable distance the longitudinal gradient will tend to make one end positive to earth and the other end negative. In such a case the magnitudes of the potentials will be governed largely by the distance between the mains and the track.

Consider now a main parallel to and a few feet distant from an electric railway and carrying services which extend under the track. The main and services will comprise an equipotential system and will assume an intermediate position, such as *DE* in the earth potential field which they occupy. In this case the services will be positive to the track and also to the earth, while the main itself being at the same potential as the services will also be positive to the track, but may actually be negative to the earth and collecting current from it. Such a condition has recently been observed under conditions similar to those just described. The main had few laterals but a large number of services which controlled its potential to a large extent. In the case referred to, the piping system was from 3 to 4 volts positive to the tracks. The earth current meter showed the services to be discharging heavily to the earth under the tracks, and the main to be collecting slightly.

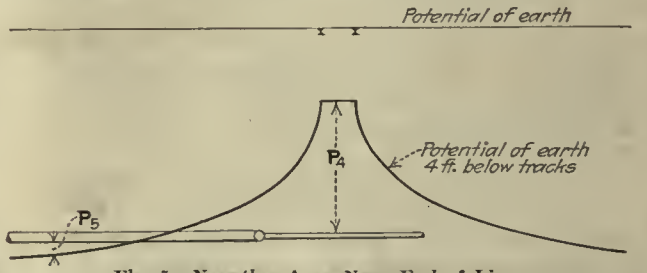


Fig. 5—Negative Area Near End of Line

Still another and the most common condition is illustrated by the piping system *GFH*. The main *F* extends parallel to the rails but is connected to numerous laterals *FG* which have a greater influence in determining its potential than do the small services *FH*. The system will, therefore, assume some such potential as that indicated in the diagram, in which the network in general

will be negative to the earth and the services strongly positive to it. The main in question may be either positive or negative to the earth, depending upon its position with respect to the track as well as the location of that portion of the network which controls its potential. Or it may be, and often is, subject to transverse electrolysis, collecting current on one side and discharging it on the other.

In a negative territory, the condition will be that shown in Fig. 5. Here the pipes collect current under a high potential difference shown as P_4 and discharge it from a relatively large area at a small potential difference, P_s. The area of discharge is ordinarily so large and the current density so small that electrolytic damages are not discernible. Contrary to this, in the positive territory the current is collected over a relatively large area at a small potential difference, P_s, and discharged near the tracks at a high potential difference, P_r. Naturally there will be some current transmitted along the piping system from the negative to the positive area, but in many instances, and particularly where long feeding distances are concerned and not very dense piping systems, this amount will be small in comparison to the total amounts of current discharged and collected by the pipes.

Potential Difference Not a Criterion

It is evident from the foregoing that potential difference measurements between pipes and tracks give practically no information as to the density of current discharge or collection at any particular point of the pipe surface. However, they do indicate the possibility of danger to that portion of the piping system, usually the services, which most closely approaches the tracks in the area under consideration. It is possible that a fairly definite relation exists between current density at pipe surfaces and potential differences for a given set of conditions involving earth resistivity, roadbed construction, size of pipe and distance between pipe and track at nearest approach. While these factors are variable and some of them often indeterminate, thereby preventing an accurate evaluation of their quantitative significance, it may safely be assumed that high potential differences between pipes and tracks are accompanied by damage to some portion of the piping system.

The foregoing also explains why small potential differences between adjacent piping systems or between pipes and cable sheaths are not indicative of current discharge between such structures. As a rule, measurements of this kind merely show the change in the earth potential between the points occupied by the two structures. If, however, by drainage or by any other means, one system is caused to assume a potential greatly different from that of the adjacent earth, there will be a local gradient in the earth near the drained structure which may cause local electrolysis at points of intersection with other systems. The potential difference observed between grounded systems may, therefore, be considered as active only at the points of nearest approach of the two systems and not throughout their course generally.

No attempt has been made here to consider the numerous variables which enter into the electrolysis problem. The sole object has been to present a proper conception of the directions and relative magnitudes of potential gradients in the earth, with the thought that it may be of value to others in analyzing and interpreting electrolysis phenomena.

Central Station for Interurban Lines at Kansas City

Proposed Building Provides Excellent Terminal Facilities and a Modern Office Building—It Will Be Located Near Center of Retail District—Construction to Be Begun May 1

ARRANGEMENTS have been made to underwrite $2,950,000 of bonds for the proposed central station for the interurban lines entering Kansas City, and construction of the building and station will begin May 1. It is expected that the electric lines will use it immediately on completion, which will be within a year.

The station is to be erected by the Interurban Central Station Company, which has the following officers: President, C. C. Peters, secretary Emery-Bird-Thayer Dry Goods Company; vice-president, R. A. Long, head of the Long-Bell lumber interests and owner of a modern office building one block from the station; secretary and general counsel, W. C. Scarritt, attorney, interested in the Scarritt Building, within two blocks of the station, and interested in much Kansas City residence and business real estate. The architects are Wight & Wight of Kansas City.

The following electric railways entering Kansas City are under franchise obligations to use the new station, and contracts for such use exist with them: Kansas City, Clay County & St. Joseph Railway; Kansas City, Kaw Valley & Western; Missouri & Kansas ("Strang Line"); Kansas City Western (Leavenworth Line); Kansas City, Lawrence & Topeka. The Kansas City Railways is, of course, a party to contracts with the entering lines and with the central station company.

The site of the station is at the northeast corner of Tenth and McGee Streets, the company owning 304 ft. on McGee and 128 ft. on Tenth, and also a strip in the center of the block through to Oak. The building will be erected on the corner with 200 ft. frontage on McGee Street. The ground floor will be used for the passenger station, except for stores and a restaurant on the street frontages. The concourse and waiting rooms will have the height of two stories, a mezzanine floor around the waiting room being used for beauty shops, writing rooms, etc. The main building will be ten stories in height on the McGee, Tenth and trainshed sides, with an open court above the concourse and west side of the building. This will provide light and air for the offices, the concourse having a skylight. Public entrances will be on both McGee and Tenth Streets.

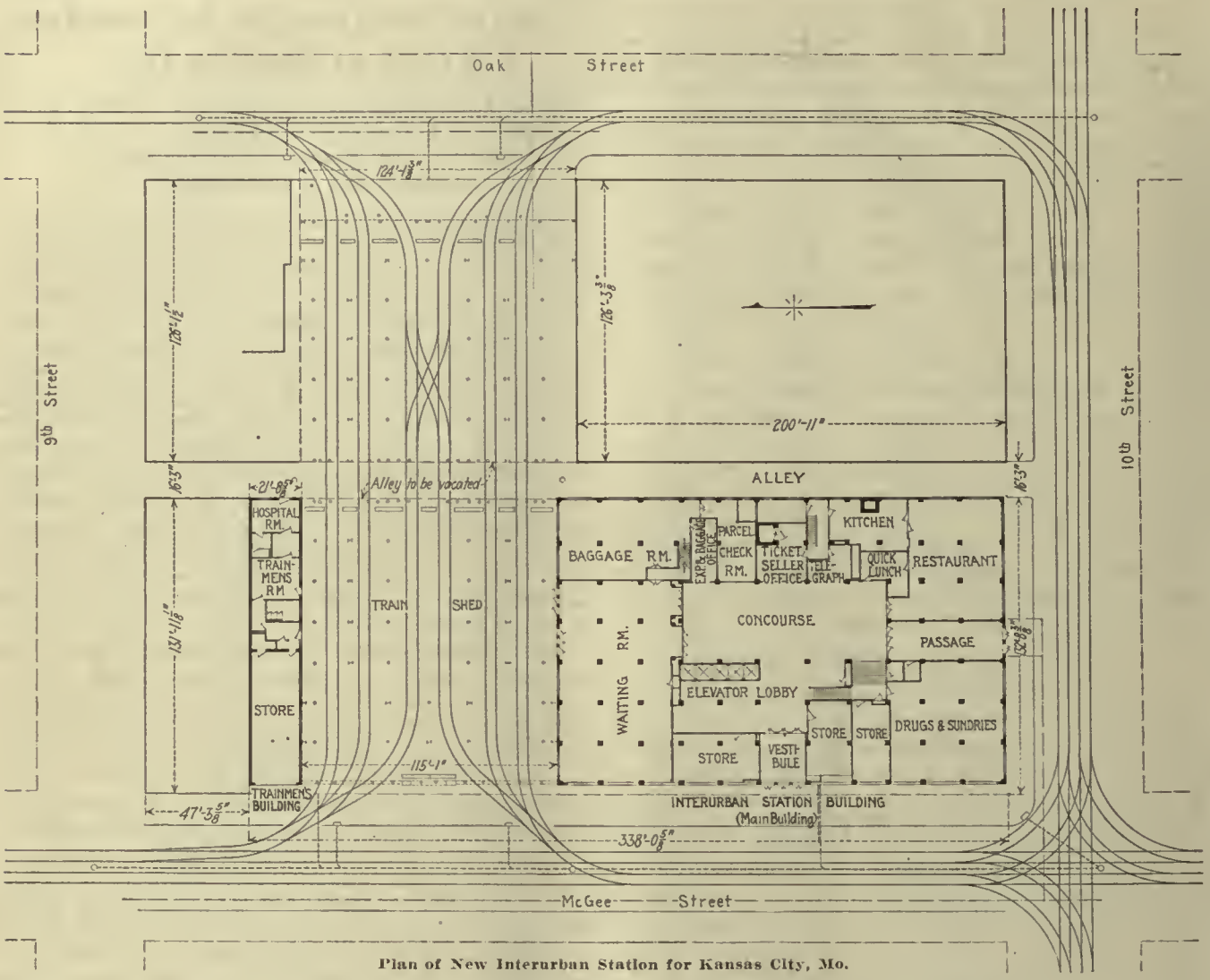
Building Will Have Many Good Features

The building will be high class in every respect. The concourse or main lobby will be finished in marble with marble columns and tile floors. It will contain the ticket offices, baggage and parcel windows. Entrances to the restaurant and the various stores will also be included. There will be a large general waiting room, and a separate waiting and retiring room for women will be provided.

The trainshed will have six tracks, each of which will hold six cars. North of the trainshed will be a building for the trainmen and an emergency hospital.

All trains will enter the station over the tracks of the Kansas City Railways via Tenth and Oak Streets. They will loop through the station and leave by way of McGee Street.

The location of the station downtown, at the very



Plan of New Interurban Station for Kansas City, Mo.

edge of the high-class shopping district, is considered significant. This was a factor in the decision to produce a particularly fine type of building, which should assist in development of the downtown district. The location will, it is said, also greatly encourage traffic because of its convenience, visitors leaving trains close to the business center. The fact that trains and waiting rooms are on the same ground floor also is expected to encourage traffic.

About 4,000,000 passengers now come into Kansas City annually over the electric lines. The station, it is estimated, will accommodate 7,000,000 annually. Officers of the central-station company suggest that use of the new station will encourage the construction of new electric lines.

The preliminary engineering work toward the location of the central station was done by Robert P. Woods, now vice-president and general manager of the Kansas City, Clay County & St. Joseph Railway. Mr. Woods made possible trackage layouts at various locations, studying them in their relation to connections with local and entering lines, and with reference to the city's physical and commercial development. These studies were considered by the interurbans prior to the organization of the company which financed the purchase of the site, and which now has completed steps toward financing the building. Howard E. Huselton and Leslie E. Baird, who were given the task of selecting the site and who enlisted Mr. Woods' aid, were instrumental in securing the franchise and in organizing the central station company.

Compulsory Motor Insurance

A SERIES of arguments on the need of compulsory insurance to cover accidents caused by automobiles has recently been made public by Jonas Rice, general manager of West Chester Street Railway, Philadelphia, Pa., and has been attracting considerable attention in Pennsylvania. Mr. Rice advocates the plan of making the insurance policy apply not to the driver but to the car and requiring the showing of such a policy before a car is licensed. The Philadelphia *Evening Bulletin* has printed Mr. Rice's arguments at length, with the views of various representatives of automobile interests on the subject, and, in general, they support the plan. A summary is also printed under the heading "A Word for Compulsory Motor Insurance" in the *Literary Digest* for March 24, 1923.

During 1922 the London County Council Tramways carried 726,000,000 passengers, this being the highest number on record. The total shows an increase of 36,000,000 passengers over 1921, which is ascribed to improved service and lower fares. The average speed of cars has been increased so that it is now the highest tramway speed attained in Great Britain.

One-Man Cars Desirable

At a Hearing in Washington, Statistics and Other Testimony Show the Value of One-Man Operation from Safety and Other Standpoints

AT A HEARING held before the Public Utilities Commission of the District of Columbia on the subject of one-man cars on Feb. 21 some interesting testimony was brought out. The hearing was held because of complaints by several citizens that the reconverted one-man cars recently put in service by the Washington Railway & Electric Company were objectionable. The complainants admitted that the cars had a place in transportation service, but claimed that their service should be confined to the suburban sections. The company has seventy of these cars in operation.

W. F. Ham, president Washington Railway & Electric Company, was the first witness. He said that on a basis of 1,523,823 car-miles, the one-man cars had had 4.20 passenger accidents per thousand car-miles, whereas the two-man cars, on a basis of 9,991,704 car-miles, had had 9.58 passenger accidents per thousand car-miles. Certain accidents, such as occur in boarding and alighting, have been greatly reduced with the one-man car. For accidents of all kinds the one-man cars had shown 29.92 per thousand car-miles as against the two-man car figure of 30.04. This includes every accident, even trivial ones. Other figures were given to show the greater immunity from accidents with the one-man car. The only serious accident which has been experienced was when a controller flashed and some of the passengers became panic-stricken and tried to get out quickly by the windows instead of the rear door. To prevent a recurrence of this trouble, since that time a line switch has been installed, and a painted handle to indicate the means of opening the emergency exit door. The accompanying view of the interior of the car shows this emergency handle at the right of the vestibule and over the ratchet brake wheel. The emergency handle is painted with stripes, and lettering appears just above it reading "emergency door lever." It is true, Mr. Ham continued, that the car has only the front entrance, but this he considered an advantage as the emergency exit would not be blocked. The most serious accident the company ever had was with an open type of car where there were twenty-eight exits, fourteen on each side. Data on comparative accidents with one and two-man cars as given in the accompanying table were presented.



Front of One-Man Car, Showing Emergency Door Lever with Painted Handle

The patronage in Washington did not indicate that the cars weren't popular there. On the lines on which these cars were being operated, during the last five months there had been a slight increase in traffic, whereas on the whole system there had been 1.14 per cent decrease. Mr. Ham brought out that the discontinuance of one man on seventy cars during the year, even at the higher wage paid for one-man car operation, would save the company $157,000 a year. The income of the company during 1922 available for a return was $739,620, which was $315,886 short of 6 per cent on the value of the property as determined by the commission. If the one-man cars operated had not been available this income would have been reduced by $71,879. Particulars were also given of the extent of the one-man car service in other cities.

The cost to convert the cars was about $1,800 a car. The cost of a new car would be $7,702, about the same as for a two-man car. Views of the one-man car operated were shown.

Henry G. Bradlee, Stone & Webster, the next witness, then gave some particulars of the thirty street railways operated by that organization and the development of the Birney car in 1916. The success with this led to the development of the larger double-truck one-man car. The Stone & Webster organization now operates about 500 Birney cars, both single and double truck, and 100 converted cars. Records kept by Stone & Webster show that on their properties during a recent twelve-month period 18,000,000 car-miles were run by one-man cars and 14,000,000 by two-man cars, with accident records per 10,000 car-miles for the one-man cars 3.8, and for the two-man cars 5.76, or 34 per cent less for the one-man car. Serious injuries had decreased 51 per cent with the one-man car. Mr. Bradlee attributed the reduction of accidents principally to the decrease in step accidents, because passengers board the car under the eye of the operator. He pointed out that in Philadelphia the Chamber of Commerce of that city had investigated the conditions on this type of car in 136 cities and approved the operation of the car for Philadelphia.

In St. Joseph, Mo., at the request of City Council, the city engineer had carried on extensive experiments to determine the value of the safety devices on the one-man type of car and had reached the conclusion that the car with these safety devices was safer than the ordinary two-man car. In the course of these experiments a Birney car was started at the top of an

11 per cent grade after the trolley had been pulled down and the air and hand brakes had been disconnected, but the motorman was able to stop the car within 120 ft. by reversing the motors. In Seattle the municipality had continued and extended the use of one-man cars on the recommendation of Peter Witt. In Detroit one-man cars had been forbidden until the city engaged in street railway operation, when a number of Birney cars were immediately ordered.

Mr. Bradlee said that sometimes the charge was made that there was excessive physical and mental strain to the operator of a one-man car. That this is incorrect is shown by the fact that companies have no difficulty in securing volunteers among their operators to take these cars because of the slight bonus paid, and by the fact that accidents are reduced, which would not occur if the operator was subject to undue strain.

Tests have shown that it takes a group of passengers somewhat longer to board Birney cars than two-man cars, perhaps a quarter of a second longer per passenger, but the Birney cars have no trouble in making the two-man schedule, because of their more rapid acceleration. The records of the J. G. Brill Company show that in percentage of all cars built at its works one-man cars constituted in 1917 28 per cent, in 1918 42 per cent and in 1919 77 per cent.

COMPARISON OF INJURY ACCIDENTS WITH TOTAL ACCIDENTS DIVIDED AS TO ONE-MAN CARS AND TWO-MAN CARS FOR 1922

	One-Man Car Accidents			Two-Man Car Accidents		
	Injury Accidents Number	Total Accidents Number	Per 100,000 Car-Miles	Injury Accidents Number	Total Accidents Number	Per 100,000 Car-Miles
Passenger Accidents:						
Boarding	4	12	0.79	79	271	2.71
Alighting	5	15	0.98	126	423	4.24
Fell from car	0	0	...	3	18	0.18
Fell in car	7	17	1.12	58	143	1.43
Stealing ride	0	0	...	0	0	...
Brake handle	0	0	...	11	11	0.11
Collision of cars	2	20	1.31	7	91	0.91
Non-Passenger Accidents:						
Collision, vehicles	10	361	23.69	74	1,686	16.87
Collision, persons	10	13	0.85	51	122	1.22
Car off track	0	0	...	4	5	0.05
Assaults, ejec., etc.	0	1	0.06	0	24	0.24
Property damage	0	3	0.20	0	32	0.32
Miscellaneous	8	14	0.92	95	176	1.76
Total	46	456	29.92	508	3,002	30.04

Notes: 10.1 injury accident per 100 one-man car accidents.
16.9 injury accidents per 100 two-man car accidents.
One-man car-miles, 1,523,823; two-man car-miles, 9,991,704. Accidents in favor of one-man cars per 100,000 car-miles, 5.38.
Percentage of one-man accidents to two-man accidents involving personal injuries, 9.0. Percentage of one-man mileage to two-man mileage, 15.2.

The speaker then gave some statistics in regard to the practice of the Eastern Massachusetts Street Railway with one-man cars, 95 per cent of its service now being of this type, and said that in all New England there are 455 single-truck and 417 double-truck cars for one-man operation. The one-man car is used with every kind of service except where train operation is advisable, that is to say, it is used in city service, in suburban service, in one-fare zones, in more than seven zones, and in the subway in Boston. Since 1917 nineteen states have approved one-man car operation, Montana being the latest.

The one-man car is the effort of the industry to adapt itself to modern economic conditions. In 1898 the cost of operation of the two-man car was practically 50 per cent of that today, and the one-man car prevents the cost going as high as it otherwise would, as each car saves from $2,000 to $3,000 a year.

He considered the Washington Railway & Electric Company's car with its double-door front entrance better than a car with a single entrance for Washington conditions. He did not know of any city in which service was given by Stone & Webster where serious opposition had developed against one-man car operation.

C. E. Morgan, Brooklyn City Railroad, was another witness. He said that in Brooklyn there are 206 single-truck Birney cars, fifty double-truck converted one-man cars with a single passageway, and 175 cars whose platforms had been lengthened to provide for double passageways and to permit either one-man or two-man operation. The company has sixty-eight lines, thirty-eight of which are operated with one-man cars. In January, 1923, the double-truck two-man cars made 3,332,920 car-miles, the Birney cars 594,337 car-miles, and the double-truck one-man cars 260,005 car-miles. The one-man cars are used in all sorts of service, including that on the Brooklyn Bridge, and are operated on Fulton Street in the most congested part of Brooklyn, where, on this trunk line, they are mixed in with other cars and trains, all operating on a nine-second headway in the evening rush hour. Their average time for loading and unloading is no greater than any other car operated in Brooklyn, the average stop being five seconds. On Nassau Avenue these cars run on a two-minute headway, in one direction pay-as-you-enter and in the opposite direction pay-as-you-leave. It is the practice in Brooklyn to make frequent traffic studies and change the schedule in accordance with the needs, but there is only one route, Jamaica Avenue, where additional running time is required because of increased traffic and the one-man car.

Mr. Morgan also pointed out that traffic officers particularly favor the one-man car because when they give the signal to start to the motorman he does not have to wait for the conductor's signal. One case where there has been objection to one-man cars in Brooklyn is the Nassau Avenue line, where pay-enter had not previously been used, and the objection was more to the change in the method of collecting fares than to the car itself. If it were not for the one-man car, eleven lines in Brooklyn would not be paying their way. The average schedule speed in Brooklyn for all cars is, average per day, 9.7 m.p.h.; rush-hour, 9.204 m.p.h.

Brooklyn has often had to increase the number of cars on a line to handle the traffic. The figures on accidents per 100,000 car-miles, as reported by 109 companies to the American Electric Railway Association, are forty-four for the one-man car and eighty-three for the two-man car; for collisions 196 for the one-man car as against 207 for the two-man car. There have been no accidents in Brooklyn due to the use of only one man on the car. The experience in Brooklyn did not indicate that there were any ill effects to the operator from the operation of the one-man cars or that the work was considered more arduous. In fact, the men preferred the one-man cars because, as one man said, "He was his own boss." Of the surface car mileage operated in Brooklyn 20.4 per cent is furnished by means of one-man cars.

Ventilation Problem Settled

The next witness was William A. Pine of Chicago, vice-president of the Railway & Utility Company, manufacturer of the "Honeycomb" ventilators used on the cars of the Washington Railway & Electric Company. He explained that the ventilator was used extensively by street and steam railroads. He presented a chart showing the cubic feet of free air discharged per hour from a railway car at different wind velocities. He pointed out that at 10 m.p.h., the average speed of the

Washington cars, 17,000 cu.ft. of air per hour per ventilator would be changed in the car each hour with the windows and doors open. With the doors and windows closed the six ventilators would exhaust 75,000 cu.ft. of air per hour, equivalent to thirty changes per hour. The ventilator is used on 20,000 street and electric cars in the United States. It is particularly well adapted to one-man cars because a car with closed ends does not have the natural ventilation that one does with both ends constantly being opened.

One of the operators then testified. He had been running a car for one and a half years and thought it safer than a two-man car, and he had found no trouble in performing his duties and had noticed no ill effects on his health. The men choose one-man cars in preference.

J. H. Hanna, vice-president Capital Traction Company, said he had had very slight experience with the one-man cars, but was very glad to see the commission approve them and would object if the commission attempted to curtail the use of these cars, as some of his lines could be operated with satisfactory results with the one-man cars. He would probably purchase some today if he was in the market for new equipment.

Better Methods for Taxing Utilities

Special Committee of National Tax Association Recommends Graduated Gross and Net Earnings Tax as Most Equitable Method, and Favors Abandonment of Property Taxes for Utilities

AT THE conference of the National Tax Association in 1920 a committee was appointed to make a study of the taxation of public utilities engaged in interstate commerce. This committee was composed of Hon. Frederick M. Davenport, member of the New York State Senate, chairman; J. G. Armson of the State Tax Commission of Minnesota, Fred R. Fairchild of Yale University, F. N. Fletcher of the Nevada Public Economy League, and M. T. Sanders of the Northern Pacific Railway. This committee has just presented a report covering this subject.

In his capacity as chairman of the New York State joint legislative committee on taxation and retrenchment Senator Davenport has paid particular attention to the subject of utility taxation. The ELECTRIC RAILWAY JOURNAL at various times has published the results of his work. In the issue of Feb. 4, 1922, a voluminous report to the Legislature of New York is abstracted, covering utility taxation in this state. In the issue of Feb. 17, 1923, is the abstract of an address by Senator Davenport on the same problem presented at the mid-year meeting of the American Electric Railway Association in Washington, D. C., Feb. 16, 1923.

The committee states that it has made investigations covering the past two years. The following is an abstract of its report, just presented to the National Tax Association:

There is great confusion in the taxation of property of interstate public utilities, resulting from an extraordinary variety of taxes and of methods being pursued in different states. There is duplication and confusion arising from the decentralized taxation of property by local jurisdictions and there is also lack of any guiding principle in the taxation of public utilities and in the placing of taxes in the tax system as a whole.

From the bewildering collection of tax methods the committee finds it possible to select three outstanding types. These are (1) the *ad valorem* basis; (2) the capitalization basis; (3) the earnings basis.

Under the *ad valorem* basis the tax is imposed upon the value of the property of the corporation. It is most widely employed. About half the states use it exclusively for the taxation of steam roads and nearly as many for the exclusive tax on telephone and telegraph companies. About a dozen states use it as the only method for taxing electric railways and water, gas and electric properties. This method as employed in the more progressive states involves expert valuation of the property of the corporation as a whole. It is also used in connection with other methods in many other states.

The capitalization basis involves the imposition of a tax upon the securities of the corporation. Sometimes the stock only is taxed, while in other cases the bonds are also included. This is generally unsatisfactory and is of declining importance. It is only used alone by a few states, perhaps a half dozen combining it with other methods.

Next to the *ad valorem* method, the earnings basis is in widest use. The tax is a certain percentage of the earnings, the rate being fixed to make the tax correspond roughly with the property tax generally. This form of tax is almost always based on the gross earnings of the corporation.

The committee states that the lack of any guiding principle is evidenced by even a cursory study of present methods of taxation. This is not merely a result of difference of opinion regarding the means, but it represents a lack of agreement on fundamental matters and principles.

In formulating its recommendations the committee has assumed the general plan of taxation outlined by the committee on a model tax system of the same association. In this three taxes are included: (1) An individual income tax; (2) a property tax on real estate and tangible properties but not on intangibles; (3) a business tax. The committee feels that taxation of tangible personal property is destined to hold a less important place in the future.

ECONOMIC RELATIONS OF PUBLIC UTILITIES

Utilities are distinguished from other business enterprises by two important characteristics: (1) They are in possession of certain special privileges granted by the government; (2) they are under obligation to render service and make reasonable charges therefor. This double obligation is enforced by public regulation.

There are three theories of taxation of utilities: (1)

Heavy taxation to be passed to the consumer; (2) no taxation; (3) taxation on an equality with other business. The committee states that the first is unsound, making high rates for service necessary, but the tax will take all over a fair return. The utilities thus act as tax gatherers for the government. The committee considers this unsound. It calls for unequal distribution of taxes on account of unequal use of the facilities by the public. If the rates are as high as the traffic will bear it is futile to attempt to shift taxes in this way.

The second theory, that of no taxation, is also untenable, as the utilities are granted certain privileges from the government like any other property owners. Such governmental service must be regarded as one of the costs of service.

The third basis the committee declares to be sound, as the general principle of equality in taxation will be questioned by few. The committee fails to find any valid argument for departure from this principle in the case of the taxation of public utilities.

The committee emphasizes two points in this connection. First, it should be recognized that equality of taxation does not require uniformity of methods or of rates, but refers only to the burden of taxation. Second, the equality must be real and not merely formal. For example, the development of an efficient process for the centralized assessment of public utility corporations may produce gross inequality because equally efficient methods of assessment are not applied to other taxpayers.

To fit utility taxation into the model tax system, it must be remembered that a fair measure of the contribution to be demanded is the essential, but that the methods used may vary. The individual income tax does not enter into corporation taxation. The burden of the property tax should depend on the amount of real estate, i.e., land and buildings. The basis of the assessment must be the same as for other taxpayers. A business tax should be levied similar to that from other business.

The committee feels that a special tax treatment is required because of the character of the property and on account of rate regulation. The property is peculiar on account of its highly technical character, since its value can be appraised only as a whole, and on account of the widespread locations of the property in many tax jurisdictions.

The assessment of public utilities is a special problem. Local assessors generally are not qualified for this work, while central assessment brings the danger that the property will be fully valued, whereas property in general is largely undervalued or overlooked. These peculiarities already have met with a breakdown of the old general property tax as applied to public utilities.

Proposed Method for Taxing Utilities

Rate regulation and taxation must go together and supplement each other. The utility should in the long run be enabled to earn a fair return on all its properties and secure fresh capital, if required, for proper maintenance and development of the enterprise. The return must permit abnormal profits in good years to offset smaller profits or losses in other years. Taxation should take part of these extra profits made under unexpectedly favorable conditions or by the more fortunate corporations.

Experience shows that the choice of the taxation basis practically is narrowed down to the *ad valorem* basis, which is open to the serious objections already pointed out, and an earnings basis. The thing that really gives worth to a corporation is its earning power. An earnings tax involves the fewest theoretical difficulties, and is comparatively simple and inexpensive to administer. It usually fluctuates with the prosperity of the corporation and generally is equitable between corporations.

The next question has to do with the relative merits of net earnings and gross earnings as the basis of the tax. The committee considers the net to be the fairest and most accurate measure of ability to pay taxes, but the gross earnings method has the advantage of greater certainty and simplicity, gross earnings being a matter of fact about which there seldom can be a difference of opinion. The determination of net income involves the deduction of a great variety of expenses, requiring exercise of judgment and possibility of disagreement and evasion.

The decision really rests upon the fundamental question as to whether the obligation to contribute to the support of the state is to be limited to those corporations that make profits. If so, the net earnings tax is indicated. If all corporations are to contribute, and if taxes are one of the necessary costs of business, the gross earnings tax is the proper method. Obviously the government must function in years when business is poor, as well as in years of prosperity.

This practical consideration seems to preclude complete adoption of the net earnings basis. In the opinion of the committee the dilemma may be met by a combination of gross and net earnings taxes. The tax should be upon the net at a certain rate with the proviso that the tax should never be less than a certain per cent of the gross. This is the same as providing two taxes, one on the gross at a moderate rate, the other on the net at a higher rate, with the proviso that the tax collected is the higher of the two. For example, a tax might be provided at 10 per cent of the net or 2 per cent of the gross, whichever were greater. Such a combination tax is a reasonable compromise between the gross earnings and the net earnings basis.

Virtually the same result could be obtained by a progressive gross earnings tax, starting with a moderate rate where the net earnings bear a small ratio to the gross or are non-existent, and advancing with the increase in ratio of net to gross. Such a combination tax is a reasonable compromise between the gross earnings and the net earnings methods. Based primarily on net earnings the tax takes account of the varying abilities of the several utilities to pay, while the requirement of a minimum contribution meets the public requirement of regular and dependable revenue. By a proper adjustment of the rates the burden may be made to correspond fairly with the property tax on other taxpayers, remembering that much intangible property and also a good deal of tangible property escape under the general property tax. The yearly fluctuations of this utility tax may be reduced by taking as a base the average of the earnings of several years instead of a single year. Additional tax on the net may serve to take some part of the profits from the more favorably situated utilities. The committee is inclined to favor such a tax.

The committee is firmly convinced that with the alternative gross or net tax as an exclusive tax no further taxation of the utility's property, either real or personal,

need be required. Probably most states will see fit to continue taxation of real estate at least, in which case the amount of such tax should be allowed as a deduction from the earnings tax, or adequate allowance should be made in fixing rates for the earnings tax.

Doubt is sometimes expressed as to the constitutional power of a state to impose a tax measured by gross earnings derived from interstate commerce, but the committee states that this can arise only from misapprehension of the decisions of the United States Supreme Court.

As to the apportionment of taxes on interstate utilities, the committee states that in view of the scope of the problem and the issues involved, it requests an opportunity to study the subject further.

"Move Up Front"

VARIOUS methods of inducing passengers to move to the front of the car after they enter at the rear platform have been tried by railway companies, with varying degrees of success. The Georgia Railway & Power Company, which operates the Atlanta system, is using a new method. This consists of a series of car



One of the Cards Urging Passengers to "Move Up Front"

cards which tell the advantages—to the passenger—of following this commendable practice. These car cards read alike except for the second line. This is varied to give the reason.

One of these cards is reproduced herewith. The others are like it except for the second line, which reads as follows:

"You Help Yourself and Others."
"You Keep Your Seat Longer, Women Will Not Move Up Front."
"You Stand More Comfortably."
"You Get a Seat More Quickly."

Speeding Up Swiss Railway Electrification

THE director-general of the Swiss Federal Railways states that the railway electrification program of the government is to be pushed rapidly. The administration has been hampered by high costs of materials, which reached a peak of 130 to 140 per cent above normal and are still 70 to 80 per cent higher than in 1913. However, bituminous coal costs twice as much as in that year, hence the incentive to electrification is strong.

At present 238 miles of the federal railways are in electric operation, as follows: Sitten-Iselle, 46½ miles; Berne-Scherzligen, 21 miles; Lucerne-Chiasso (Gotthard), 140 miles; Lucerne-Zug, 16 miles; Zug-Goldau, 10 miles; Immensee-Rotkreuz, 4½ miles. The Zug-Zurich section was also due to be completed within the past few days.

According to the program of 1918 other lines of a combined length of 695 miles were to be electrified in fifteen years, including the following: Lausanne-Geneva, Solothurn-Olten, Lausanne-Berne, Basle-Brugg, Zurich-Olten-Berne, Zurich-Winterthur, Winterthur-St. Gall and Thalwil-Chur.

The electrification program will require more than 750,000,000 francs, of which 300,000,000 francs had been expended up to the end of 1922. In addition 23,000,000 more will be required for the reconstruction of bridges.

Recently the schedule has been advanced with a view to completing the above program by 1928, or at the rate of about 118 miles per year.

To provide electrical energy for the electrified lines, the power of the Barberine River will be developed first, in the plants at Vernayaz and Chatelard. The cost, included in the above, will be about 42,000,000 francs. Connections will be arranged with the St. Gotthard and Canton of Valais power plants. Substations will be constructed at Coppet, Bussigny, Yverdon, Fribourg, Biel, Burgdorf, Basle, Brugg, Oerlikon, Eglisau, Winterthur, Gossau and Sulgen.

Altogether 400 electric locomotives and motor cars will be required, of which 141 have been delivered to date. Of the total expenditure one-quarter will be made abroad.

St. Louis Will Save $189,900 in Power Bills

THE use of an Economy meter in each of the cars of the United Railways of St. Louis will result in a total net saving for the first year, after paying for the equipment, of $69,000, according to figures given out recently by Col. Albert T. Perkins, general manager for the receiver. The company will save a gross total of $189,900 in power bills during this first year. He states that the decision to equip all the cars with these meters was based on two considerations: First, to save expense; second, to conserve current so that the company could increase the car service without making provision for additional power. He said that the results show two additional economies not at first considered—safer operation and better care of the equipment.

According to the instructions given the motormen, there are four ways in which power can be saved. These are: (1) By running on schedule and not losing time on the road; (2) by not running on the resistance points of the controller; (3) by not running with the power and brakes on at the same time; (4) by coasting every foot possible without using power.

Colonel Perkins stated that motormen are told that running on schedule saves power, as it is then not necessary to make quick getaways and short stops to pick up lost time. They are told that much of the power taken from the trolley is wasted in the resistance while running on the resistance points, and that running with brakes and power both on means that power, brakeshoes and wheels are wasted. Colonel Perkins said that throughout the instruction given the motormen it is emphasized that safety of passengers is the first consideration, with schedules second and power saving third.

The Personal Touch in Public Relations

Some of the Ways in Which P. F. Sheehan, Manager Fall River Division Eastern Massachusetts Street Railway, Is Succeeding in Getting Railway Patrons to Appreciate the Utility Point of View

ABOUT a year and a half ago P. F. Sheehan was transferred from the managership of the Brockton division of what still persists in the minds of the old-timers as the Bay State Street Railway to the Fall River division. He succeeded A. J. Boardman; in fact, he and Mr. Boardman swapped places.

Mr. Sheehan, who is familiarly and affectionately known as "Pat" by his fellow Rotarians and his business compeers generally, his Christian name being Patrick, began his local career in Fall River by establishing friendly relations with the public as promptly as possible. His philosophy is that the public reflects the temper of the railway management. Thus if a helpful reaction from patrons is expected there must be an aggressive cordiality from the manager and his confrères. In other words, believes Mr. Sheehan, the public has the mirror-like characteristic of reflecting what it sees in its purveyor of public service.

In coming to his new post, Manager Sheehan found a substantial foundation of good feeling left behind by his predecessor. He proceeded at once to build on this. He addressed a letter to every considerable employer of labor in town asking him about the transportation requirements of his employees and requesting such co-operation as would enable the company to have cars on hand in sufficient numbers where and when they were needed. The response was gratifying, and the patrons expressed satisfaction that it was proposed to consider and meet their individual requirements.

The next step was to write to local merchants, asking them to collect for the benefit of the service such criticisms as their employees cared to make, or to pass on from the numerous customers with whom they came in contact. The result of this rather risky procedure was that although the matter was canvassed thoroughly by the merchants among their employees practically no criticism developed.

Mr. Sheehan finds that his relations with the public are greatly facilitated by what is known as the "Home Rule Committee." This comprises six men, including the president of the Board of Aldermen and the city solicitor as ex officio members. The four other men are picked by the Mayor to represent different lines of business, including labor. At present the membership includes a mill agent, a dry-goods merchant and a cotton broker. The terms of the four men are indefinite. Mr. Sheehan serves as secretary, although not a member of the committee.

The Home Rule Committee was inaugurated by the Chamber of Commerce about three years ago. Its function is to study the local street railway situation with respect to service, etc. It meets twice each month. It is helpful both to the public and the railway in serving as a means of inspiring confidence in the service. For example, when the company put into operation a reduced fare plan under which it sells for $1 a twenty-trip ticket which any number of people can use, the Home Rule Committee backed up the company as to the reasonableness of retaining the 10-cent cash fare for those who do not wish to invest $1 at one time. The company, however, made a concession in selling a divisible ticket which two people can use separately although it must be purchased as a unit.

Telling the Public About It

The Home Rule Committee recently requested Mr. Sheehan to furnish for the benefit of the public a statement with regard to the work performed in the Fall River district during 1922. This gave him an excellent opportunity to explain the different jobs that had been carried out which had been made possible through the "contributions of the stockholders" without the issuance of additional securities. He showed that 23,880 ft. of track had been rebuilt, several thousand feet overhauled and several pieces of special trackwork put in. In the performance of this work there were in constant service five welding machines and six grinding machines. There were seam-welded 2,745 joints, surface-welded 6,445 joints and ground 8,899 joints, while 23,458 ft. of corrugated rail was surfaced. In new and overhauling work 14,872 creosoted ties were installed. The total cost of the trackwork was about $190,000. A fourth Russell sweeper was added to the equipment as well as three cars equipped with Root scrapers. Many other improvements were mentioned in this report

Mr. Sheehan finds the liberal distribution of timetables for all of the local lines a good form of publicity. A folder is distributed for each line, containing first the time points and timetables for all lines, with special information for the individual line on the last page.

Last Christmas the railway did a number of public institutions a good turn by sending around town a car with a Santa Claus on the roof for the purpose of interesting possible contributions of gifts for these institutions. The merchants co-operated in this effort with the result that the institutions were liberally remembered on Christmas Day.

Fall River is one of the important divisions of the Eastern Massachusetts Street Railway system. As has been mentioned it has been greatly improved physically during the past months. This, together with the efforts of the management to develop a friendly attitude on the part of the public, ought to be fruitful in still further strengthening the position of the division in the local system.



Car Cards Used Last Holiday Season to Promote Good Public Relations

Midi Electrification Making Rapid Progress

Direct-Current Operation Was Inaugurated Last October and by the End of 1923 Enough of the System Will Have Been Electrified to Demonstrate the Expected Economies

THE Midi Railway, in southern France, has made a substantial start in its program of electrification of 1,950 miles of line, designed to permit it to utilize the abundant water power which is available in the Pyrenees, the Cévennes, and the "Massif Central." Simultaneously with the new work, which is being carried out at 1,500 volts d.c., the single-phase already installed is being replaced by direct current.

Since the fall of last year, electric trains have operated between Pau and Montrejeau, and in 1923 Toulouse in one direction and Dax in the other will be reached. The electrification will be rapidly extended until within twenty years, unless the present program is modified, only the Bordeaux-Cette line and its branches will be steam operated.

The power supply for the Midi electrification will be from hydro-electric stations, with three-phase, 50-cycle transmission at 60,000 volts. Part of this power will be used at 60,000 volts, and the remainder will be raised to 150,000 volts to feed into a super-power system for the benefit of the large power-using communities within reach.

In the railway substations the power will be transformed, in rotary converters in some cases, in mercury-vapor converters in others, to 1,500 volts d.c. The supply for lighting and power purposes in the stations along the line of the electrification will be at 10,000 volts. This year the 150,000-volt lines will supply the requirements for power as far as Bordeaux and soon thereafter the benefits will be extended to Toulouse. Plans for five transforming stations (60,000 to 150,000 volts) are definitely planned and another is under consideration. In three of these stations large synchronous condensers will be installed. The stations will be of the outdoor type, except for apparatus that would be injured by the weather.

There will be seventeen traction substations, mostly containing 750-volt rotary converters, two in series per group. Three of the substations will contain 1,500-volt rotaries, and five mercury-vapor converters. The capacities of the substations will vary from 1,000 to 6,000 kw. None of them at present will be provided with automatic control.

Double-Catenary Contact Line Adopted

The contact line will be double catenary, as used on the New Haven, New York, Westchester & Boston, Erie and other roads in this country. There will be a steel messenger wire of 140,000 circ.mil area, an intermediate or secondary copper wire of 198,000 circ.mil area, and a copper contact wire of 198,000 circ.mil area. The lower two wires will be fastened together by clips placed, on the average, about 10 ft. apart. The spans on the tangent track will be about 300 ft. and the hangers connecting the intermediate wire and the messenger will be spaced about 30 ft. apart. High-speed circuit breakers will be placed in the substations to protect the rotaries from the effect of short circuits. There will be reactance coils in the 1,500-volt d.c. line, with condensers shunted with resistance connected between the line and ground. This will be done to protect the d.c. apparatus.

The neutral of the three-phase high-tension line will be grounded, and both 60,000-volt and 150,000-volt lines will be protected by circuit breakers controlled by maximum current, reverse current and differential relays.

The motive power for trains on the Midi electrification will comprise both locomotives and multiple-unit cars. The weight of a locomotive equipped is about 80 tons, and the capacity is 1,400 hp. for one hour. Multiple-unit cars will be equipped with two motors each, on one truck and connected in series, the horsepower per car being 500.

Details of this electrification have been given from time to time in the ELECTRIC RAILWAY JOURNAL. *L'Industrie des Tramways, Chemins de Fer et Transports Publics Automobiles* devotes a large part of its January, 1923, issue to the Midi electrification.

The Need for Industrial Standardization

By ALBERT W. WHITNEY
Chairman American Engineering Standards Committee

STANDARDIZATION has two effects. It produces greater efficiency; by a reduction of the multiplicity of processes and products it allows for concentration on those that are worth while; the resulting increase in efficiency is effective all along the line, not merely in manufacturing but in selling and in buying.

In addition to this it frees the human spirit for making further advances. If there were no standardization the creators of ideas would have to be continually recreating and would have no time for further advance. Whenever a bolt or an I-beam or a generator was needed it would have to be a matter for design. Standardization allows such needs to be taken care of through routine process and the creative spirit is relieved for fresh first-hand adventures.

Instead of killing invention and initiative standardization is the very basis upon which it rests. It is standardization that makes further invention possible.

To a remarkable extent both the body and mind are standardized. If our bodies were not essentially alike we could have no surgery or medicine, for a surgeon in operating for appendicitis might find a heart when he was looking for an appendix. If our minds were not essentially alike we could have no organized education; education would have to be an individual process.

The similarity of our bodies and minds affords the underlying basis on which we can construct social life and civilization, and yet it is the departure from the standard which gives the touch of individuality and which not only gives the charm to our social contacts but which makes the cutting edge of progress.

There is a danger in standardization, the danger of too early and too drastic standardization, but there is a danger connected with the use of any powerful instrument. The problem of civilization and progress is to a very great extent a problem in the wise use of standardization.

I have used the term standardization in the broadest possible sense. Every factory, for instance, is carrying on its own standardization; every industry is carrying on its own standardization. Some of this work is on

a very large scale. But there is a standardization which transcends these in that it endeavors not only to operate on a national scale and to cover all industries but to bring all points of view, those of the manufacturer, the consumer and the public, to a common focus.

There are three organizations that are bearing the brunt of this work, the United States Chamber of Commerce, the Department of Commerce of the federal government and the American Engineering Standards Committee.

The United States Chamber of Commerce is doing a valuable work in interesting manufacturers in standardization and particularly in simplification. It has been the direct cause of considerable work that has been done in this field that is of a national character.

The Department of Commerce is advancing standardization in two ways; in the first place, through the Bureau of Standards, a very valuable adjunct to the government. The Bureau of Standards, both as a research institution and as a co-ordinator of government activities in standardization and as a co-operator with industry itself, is doing a most valuable work.

In addition to the Bureau of Standards, Mr. Hoover has initiated a new department known as the Division of Simplified Practice which is engaged on the non-technical side of the field of standardization. It endeavors to bring manufacturers together through their trade associations in adopting plans to reduce the unnecessary variety that is found in industry.

The third national standardizing body is the American Engineering Standards Committee. This body serves as a clearing house for standardization. It does not initiate standardization projects, nor does it do standardization work itself. It encourages standardization and it provides a general outline of procedure which if followed will entitle the standard to be listed as an approved American standard. This standard is in no sense mandatory, but in actual practice it does to a very considerable extent, because of its intrinsic merit and the representative way in which it was produced, become the American standard in its field.

The process is this: When there has been brought to our attention in a convincing way the fact that there should be standardization in a given field, a conference is called and to this conference are invited all national associations and other representative bodies that are known to be interested. This conference decides whether standardization should be undertaken, and if the decision is in the affirmative it makes a recommendation to that effect to the American Engineering Standards Committee, and also with regard to the national association or other representative body which shall act as sponsor in the preparation of the standard.

The sponsor chosen by the American Engineering Standards Committee creates a sectional committee. This sectional committee is not a committee of the American Engineering Standards Committee but directly represents the bodies that are interested in the particular standardization project. When the sectional committee has completed its work the standard is turned over to the American Engineering Standards Committee for approval. The American Engineering Standards Committee does not pass upon its technical details but solely upon the question of whether the work has been performed in a thoroughly representative way.

The American Engineering Standards Committee has more than 120 projects under way at the present time, twenty-eight of which represent standards that have been approved. On the last count, I believe twenty-two national associations were working on sectional committees represented by some thousand individuals. Thus a large part of our industries are represented.

The Readers' Forum

Reasons for Trial of Chrome-Nickel Steel for Special Trackwork in Milwaukee

149 BROADWAY, NEW YORK, March 30,1923.

To the Editors:

The abstract of Mr. Hibbard's paper before the E. M. B. A. Technical League in Milwaukee, appearing in the March 17 issue of ELECTRIC RAILWAY JOURNAL, discloses important and interesting experience in the use of chrome-nickel cast steel in special work. It is apparent that so far as four years of experience can disclose, an advance in special work manufacture was undertaken when chrome-nickel steel castings were applied to this weakest of railway engineering structures.

Not so much for the purpose of historical accuracy, but rather to point out how experience in other branches may influence railway engineering, it may be of interest to indicate the origin of the application of chrome-nickel steel for the purpose under discussion. While initial cost of castings played some, but a minor, part in determining on the experimental use of chrome-nickel steel, it was not the deciding factor in the writer's mind when advising the use of this material. He based his determination on the following factors: (a) Castings which could be repaired by welding were desirable; (b) castings which could be machined with ordinary machine shop tools were wanted; (c) castings possessing inherent toughness while sacrificing some kinds of hardness might give a longer life in service than the manganese steel castings theretofore largely used; (d) information in our possession indicated that the Krupps had been making laminated armor plate of a composition not greatly different from that later adopted for special work; (e) there were in the process of manufacture in the Milwaukee district chrome-nickel steel ingots for naval gun jackets requiring subsequent forging and machining to final dimensions. The steel was, accordingly, readily available for experimental work.

The then relative costs of manganese and chrome-nickel castings gave an additional incentive. The fortunate experience resulting from this material is clearly set forth in Mr. Hibbard's paper.

At least two years prior to beginning of the use of chrome-nickel steel, instructions were issued to the engineering division of the way and structure department to study and develop new designs for special work foundations and supports, hoping thereby to minimize the breakages in special work and the disturbances in pavement resulting from failure of foundations and supporting ties. The new foundation design was completed in time to permit its use with one of the first complete sets of chrome-nickel steel crossings. The comparative wearing values of chrome-nickel and manganese steels cannot be accurately determined unless they be tested under identical conditions. Probably chrome-nickel steel contributed more than the new type of foundation to the lower rate of wear of the new special work, but ultimate useful life in service is likely to prove to be a composite result of material of castings and character of foundation.

J. D. MORTIMER.

Association News & Discussions

American Welding Society to Hold Annual Meeting

ANNOUNCEMENT regarding the program of the annual meeting of the American Welding Society, the headquarters of which are at 33 West Thirty-ninth Street, New York City, are being sent out by acting Secretary M. M. Kelly. The meeting will be held at the Engineering Societies' Building in New York City on April 24-27.

During the morning, afternoon and evening sessions on April 24 reports will be received from the committees on training of operators, resistance welding, electric arc welding and welding of storage tanks.

The morning of April 25 will be taken up with a business session and brief papers regarding new developments in electric, gas, resistance and thermit welding. At 1:30 p.m. an inspection trip will be made through the welding department of the Third Avenue Railway System, members and guests assembling for this purpose at Sixty-fifth Street and Third Avenue. The annual dinner will be held at 7 p.m. on April 25 at the Park Avenue Hotel.

The American Bureau of Welding will "have the floor" on the morning of April 26, and during the afternoon of this day the board of directors of the American Welding Society will meet. Simultaneously there will be a report of the committee on specifications for steel to be welded. A technical session of the Welding Society will be held in the evening also.

The morning session on April 27 will be devoted to a report of the gas welding committee, and the convention will close with an inspection trip in the afternoon.

Five Transportation Committees Appointed

THE United States Chamber of Commerce has decided to appoint five committees to discuss different phases of the transportation problem. These committees will probably be able to make progress reports at the eleventh annual meeting on May 7-10. They will work under the direction of a general committee, which will be appointed after the return of President Barnes of the National Chamber from the Rome meeting. The names of the committees and their chairmen follow:

Committee on "Relation of Highways and Motor Transport to Other Transportation Agencies," A. H. Swayne, vice-president General Motors Company, chairman.

Committee on "Proper Co-ordination of Rail and Waterway Services," W. L. Clause, chairman of board of directors Pittsburgh Plate Glass Company, chairman.

Committee on "Railroad Consolidation," Carl R. Gray, president Union Pacific Railroad, chairman.

Committee on "Governmental Relations to Transportation," George A. Post, New York, chairman.

Committee on "Readjustment of Relative Freight Rate Schedules," Fred A. Delano, New York, chairman.

The personnel of the three committees first mentioned has been published, and shows that Philip H. Gadsden, vice-president United Gas Improvement Company, is one of the members of the committee first mentioned.

Reports on Rail and Ballast at A.R.E.A. Meeting

ABSTRACTS of many of the reports presented at the annual meeting of the American Railway Engineering Association were given in the issue of this paper for March 24, page 523. Supplementing this are the following notes on important points, from the electric railway engineer's standpoint, in the reports on rail and ballast.

RAIL

The committee on rail appeared to be principally concerned in rendering its statistics on rail failures more reliable. The committee felt the need for a common and universal description of rail failures, so that the railways would know exactly what they were reporting upon. A new plan was, therefore, devised, under which reports will be asked for on the following basis: Miles of track laid in a given year; miles of this track in service during the year for which failures are recorded; number of failures for the year in question, and rate of failures per 100 miles of track. With the data for each year of the life of the rail in hand, the committee plans to work out the rate of failure per 100 year-miles for each year, and for each year to date. A comparison of these rates shows the quality of service being given by the rail.

For example, a 100-lb. P.S. rail rolled in 1910 and laid on the Fort Wayne division of the Pennsylvania System showed after five years of service 37.18 failures per 100 year-miles during 1915 and 30.21 failures for the period. The corresponding figures for 1922 were 333.33 and 72.24 failures respectively. The ratio in each case is a measure of the rail's present serviceability. The average life of the above rail in 1922 was 9.42 years.

The committee presented for approval specifications for heat-treated track bolts and for nutlocks, and stated that work is being done on the design for a 150-lb. rail section, although there is as yet nothing definite to report. While the committee expressed no opinion as to the proper length of rail over 33 ft., it submitted its belief that a rail length greater than this is desirable. A length of 39 ft. seems to be favored by roads which have tried out such rails.

As to rail canting, the Canadian Pacific, New Haven, Boston & Maine, Lehigh Valley, Erie and Southern Pacific appear to comprise all railroads which have standardized this feature, although a dozen other roads are co-operating in experimental work. The first five mentioned have standardized on a canting of one in twenty, the Erie on one in forty and the Southern Pacific on one in forty-four.

BALLAST

The report of the committee on ballast contained valuable cost data covering the application of ballast, with particular reference to the relative cost of mechanical and hand tamping. The data show substantial economies due to the use of air and electric tamping as compared with hand. Specifications for ballast shovels were also submitted.

An appendix to the report contained suggestions as to the care and handling of mechanical tie tampers. A detailed account of the method followed on the New York Central Railroad along these lines was given. The difficulty of formulating hard and fast rules, however, was explained by means of the statement that four representative railways that have gone somewhat extensively into the use of mechanical tampers have four widely divergent methods of handling.

A.E.S.C. Reports on A.E.R.A. Standards

UNDER date of April 2 the American Engineering Standards Committee has issued a report as to the status of proposed standards submitted by the American Electric Railway Association. The approval of six standards has already been reported. (See issue of this paper for Feb. 24, page 341, and editorial in same issue, page 316.) Regarding the others the following information is given by the A.E.S.C.

Specifications for galvanizing or sherardizing on iron and steel, specifications for 600-volt direct-current overhead trolley construction, and specifications for wood poles and tubular steel poles have been referred to special committees for their recommendation as to approval by the A.E.S.C.

Specifications for 7-in., 80-lb. and 7-in., 91-lb. girder rails, and specifications for materials for use in the manufacture of special trackwork have been referred to a sectional committee. The sponsorship for these three projects has been assigned to the American Electric Railway Association.

American Association News

Executive Committee

THE executive committee of the American Association met at Association headquarters, New York, April 6, with the following present: President C. D. Emmons, W. H. Sawyer, A. A. Hale, G. T. Seely, L. S. Storrs, B. I. Budd, Barron Collier, F. R. Coates, J. G. Barry, S. M. Curwen, J. N. Shannahan, P. H. Gadsden, C. E. Morgan, J. P. Barnes, R. I. Todd, C. R. Ellicott, L. E. Gould, M. B. Lambert and Secretary Welsh, and the following guests: J. H. Hanna, L. H. Palmer, W. F. Ham, L. W. Shugg, H. R. Hayes and C. C. Peirce.

Mr. Hanna reported the official outcome of the mid-year meeting. Including all expenses, there was a deficit of $632. This compared with a loss at the Indianapolis mid-year meeting of $2,254 and at the Chicago meeting of $4,072.

Reporting for the committee on policy, Mr. Budd presented the recommendation that the establishment of a medical and surgical section be not approved, but that the Claims and the Transportation and Traffic Associations should plan to have medical and surgical committees. This plan was approved by the executive committee.

On report of Mr. Shugg, chairman of the committee on exhibits, the executive committee approved a price of 65 cents per square foot for exhibit space at Atlantic City in October.

Secretary Welsh presented the report of the committee on national relations which brought to the attention of the members that the Interstate Commerce Commission had informed the Chicago, North Shore & Milwaukee Railroad in its case with respect to Section 15-A of the Transportation Act, that unless advised to the contrary it would not be required to file reports under the provisions of this act. It was brought out that it was extremely important that all interurban railways file briefs with the commission on Section 15-A, as the North Shore decision would be a criterion of whether the act applied to other interurban lines only if they filed briefs.

The executive committee approved the report of the committee on subjects and meetings presented by Mr. Shannahan, as it appears in this issue under the report of that committee.

The committee approved the plan of the publicity committee for conducting a campaign dealing with costs of operation. Mr. Budd discussed the necessity of taking a more aggressive attitude about railway publicity, suggesting that this should deal with accomplishments and the great work being done rather than to apologize for shortcomings or to continue a defensive attitude. Considerable discussion followed about the agitation for 5-cent fares, and against commission regulation and use of one-man cars. Plans were set on foot to endeavor more effectively to meet these situations.

The chartering of a new company section on the Chicago, North Shore & Milwaukee Railroad, which starts off with 165 members, was approved, as well as the form of charter for use in such cases. The executive committee approved the recommendation of a special committee that the electric railway association join with the power, telephone, railroad and telegraph interests in forming an American Committee on Inductive Co-ordination.

An invitation from the N. E. L. A. to appoint representatives to sit in the meetings of a new committee of the latter association on customer ownership of securities, looking toward a standard handling and understanding of this type of financing, was accepted. Two members of the executive committee are to be appointed by the president to sit with this committee.

The committee voted "Aye" on referendum 41 of the United States Chamber of Commerce.

Mr. Gadsden discussed the forthcoming transportation meeting of the United States Chamber of Commerce and told of the manner in which the electric railway industry will be represented in the general investigation of "Transportation Needs" of the country. He considered this one of the greatest opportunities that has ever come to the interurban railways to establish their place in the transportation facilities of the country. Under the direction of Mr. Gadsden considerable information and data are being worked up at Association Headquarters to be incorporated into the report of the chamber committee on the relation of highway transportation to other forms of transportation. The executive committee approved a motion to give Mr. Gadsden whatever assistance he might need.

At the request of E. F. Wickwire the executive committee approved a convention meeting of the manufacturers, looking toward a furthering of the co-operation of manufacturers in telling the story of the electric railways.

The next meeting of the committee will be held in New York on May 25.

Valuation Committee

THE committee on valuation met at association headquarters, New York, on April 4, with Chairman J. P. Barnes, E. J. Bechtel, W. H. Maltbie, J. A. Emery, Frank Silliman, Jr., H. A. Clarke, W. Findlay Downs, G. W. Gillespie and Prof. A. S. Richey in attendance.

There were presented reports of the two sub-committees—one to make a study of the value of price trend curves in valuation work, and the other to study the relative weight to be given various methods of making valuation. The sub-committee on price trend curves presented a suggested report for inclusion in the final report of the committee, which dealt largely with the economics of the problem and reached a general conclusion which tended to discredit the use of price trend curves as an element in valuation work, except in a very limited way.

It was planned during the meeting to amplify the committees' work by getting price trend curves covering specifically electric railway materials, as some of the committee members had found that while the trend of these materials followed along very closely with the trend of the general commodity curve up to 1920, it has since varied widely from it. Since 1920 the electric railway materials curve is very much higher than the general commodity curve, presumably because of the very large demand for railway equipment and construction materials.

The sub-committee on weighting of various methods of valuation reported that it plans to make a compilation of the views of various state commissions and the I. C. C. on the weighting to be assigned to each method, and then to consult with the various commissions on what the committee has found as the indicated views of each commission, and from all of this to draw conclusions. The committee was tentatively of the opinion that first weighting as a rate base should be given to the method which bases valuation on the fair reproduction cost with prices as of the average of the future period during which the rate is likely to be effective, rather than as of any past period or specific date.

The committee also decided to undertake to develop an example showing how to use the yardstick method of valuation. This would be of particular value to small properties, where this example could be interpreted for local use.

Subjects and Meetings

THE American Association committee on subjects and meetings met in Association headquarters April 5 and laid out a tentative program for the annual convention. Preliminary to planning the subjects the committee decided to hold three morning sessions of the American Association and one evening session. It was also decided that the presentation of committee reports on the floor of the convention should be limited to those having really general interest to the membership, and that those presented would be abstracted only, as the plan will be to print and distribute the reports in advance. On this basis the time will be devoted to discussion of reports rather than presentation. Each three-hour session will be given over for the first hour and a half to committee reports and the remaining time for special papers or addresses and discussion.

The subjects tentatively agreed upon were as follows:

First session, president's address, and the co-ordination of bus with railway:

second session, a program surrounding the Federal Electric Railways Commission report, and customer ownership of utilities; third session, the irreducible costs of operation, and the human side of management. At the evening session the plan will be to have two speakers of national importance with some special features of particular interest and value to the membership.

Those present at the meeting were: Chairman J. N. Shannahan, President C. D. Emmons, G. T. Seely, Colonel J. E. Hutcheson, L. H. Palmer, W. F. Ham, C. R. Ellicott, H. V. Bozell, H. C. Clark and Gen. G. H. Harries.

Coal Supply Special Service Discontinued

THE special services of Col. John P. Jackson, representing the joint fuel committee of the three national utility associations, in assisting electric railway companies to secure coal supply, at the Washington office of the Association, were discontinued on April 1, 1923. The extreme emergency has passed and the number of cases requiring attention has diminished greatly during the past few months.

The association maintains its Washington office under the direction of Charles L. Henry, chairman of the committee on national relations. P. W. McGovern, the local representative of the association, 949 Munsey Building, will handle any matter concerning coal supply.

Storrs and Gadsden Candidates for Directors U. S. Chamber of Commerce

TWO past-presidents of the association, L. S. Storrs and P. H. Gadsden, have been placed in nomination as members of the board of directors of the United States Chamber of Commerce for election at the next annual meeting to be held in New York City, May 7-10, 1923. Mr. Gadsden is a candidate from the second election district, comprising New York, New Jersey, Pennsylvania, Delaware, Maryland and the District of Columbia, while Mr. Storrs is a candidate for election from the Department of Transportation and Communication.

Both Mr. Storrs and Mr. Gadsden are very familiar with the activities of the Chamber of Commerce in view of their past official connection with it, and are particularly well fitted to serve on its board of directors.

Boston Meeting of Way Committee

THE committee on way matters of the Engineering Association met in Boston on March 22 at the Engineers' Club.

On the standardization of frogs and car-clearance easements, a sub-committee reported that it had been unable to agree on a method of standardization and wished the entire committee to decide upon the best procedure. The sub-committee was directed to continue its work, although there will not be time to prepare a final report on the subject for the convention. The committee, therefore, will recommend a continuance of the study of this subject.

After discussion of the design of substitute ties, the committee voted to arrange if possible for co-operation with the American Railway Association committee which is studying the tie problem. Co-operation was also suggested with the A.R.A. committee on the design of small bridges, culverts and trestles.

A comprehensive report on the design of track construction for paved streets, prepared as a result of correspondence between H. H. George and the appropriate committee of the American Society for Municipal Improvements, was next considered. After slight revision the report was approved and Mr. George was requested to present appropriate specifications at the next committee meeting.

Regarding the welded rail joint tests, W.W.Wysor reported the result of the Washington meeting of the committee on welded rail joints, and of plans for motors and equipment for the circular joint-testing machine. The discussion by the way committee showed appreciation of the necessity for conducting the contemplated tests and the importance of hastening the work.

As to revision of existing standards and recommendations of standards to the American Engineering Standards Committee, R. C. Cram reported that six out of nine specifications submitted had been approved, and that three unapproved ones had been referred to the sectional committee for action. The last named included specifications for 7-in., 91-lb. and 80-lb. plain girder rails, and materials for manufacture of special trackwork.

The committee voted to recommend the advancement of the present practice of designating compromise joints to "standard practice." The chairman announced that W. W. Wysor would succeed W. R. Dunham, Jr., as chairman of the sub-committee in charge of this subject.

E. B. Entwisle reported for the committee on revision of specifications for manganese steel switch pieces that only slight revisions need to be made in the present specifications. His sub-committee was asked to continue the preparation of specifications for manganese crossings for electric over steam railways, and also to submit at the next meeting a design for use as a basis for such specifications. Victor Angerer was asked to co-operate with the A.R.A. committee and endeavor to secure the adoption of one specification for both associations.

On the revision and correction of the Manual, the committee expressed the hope that all engineers interested would co-operate with R. C. Cram and the sub-committee in charge of this work in assisting in correcting and revising the Manual before it is bound in permanent book form.

C. A. Alden reported that the special committee on wheel contour and curved treads had held a meeting and that he had been requested to submit designs for consideration by the special committee. The way committee agreed with Mr. Alden that the special committee should decide the matter of wheel and head contours first.

In closing its meeting, the committee expressed appreciation of the hospitality of H. M. Steward and of the New England Street Railway Club.

The meeting was attended by the following members: W. F. Graves, chairman; H. H. George, vice-chairman; R. C. Cram, sponsor; C. A. Alden, V. Angerer, W. R. Dunham, Jr., E. B. Entwisle, R. B. Fisher, H. Fort Flowers, C. F. Gailor, E. M. T. Ryder and W. W. Wysor. H. M. Steward, Boston Elevated Railway; S. G. Hughes, Differential Car Company, and H. F. Heyl, Taylor-Wharton Iron & Steel Company, also attended as guests.

Committee on Insurance

THE committee on insurance of the American Electric Railway Association met in New York on March 22 with the following in attendance: John T. Staub, Baltimore, chairman; G. H. Bourne, New York; W. H. Daniels, Boston; J. H. Moran, Boston; H. A. Nicholl, Anderson; F. J. Spaulding, Brooklyn. The committee first reviewed briefly the activities of the previous committees on insurance and then decided to send out a questionnaire to all railway member companies asking for details of the amount of fire insurance carried, premiums paid, losses, etc., annually from 1916 to 1922. Various sub-committees were then appointed, as follows: Rates and insurance statistics, C. B. Scott, chairman; H. A. Nicholl, P. N. Wilson, and Williston Fish; standardization of insurance form, J. H. Moran, chairman; W. H. Daniels and G. H. Bourne; fidelity bonding rates, G. H. Bourne, chairman; C. E. Morgan and J. H. Moran.

Delegates to Chamber of Commerce Meeting

THE American Electric Railway Association has the right to appoint a national councillor and nine delegates, with alternates, to the annual meeting of the Chamber of Commerce of the United States. The list of appointments has just been given out, and consists of the following:

National Councillor: J. N. Shannahan, Hampton, Va. Delegates: C. D. Emmons, Baltimore; J. G. Barry, Schenectady; H. W. Blake, New York; Edward Dana, Boston; P. H. Gadsden, Philadelphia; C. E. Morgan, Brooklyn; J. H. Pardee, New York; L. S. Storrs, New Haven; C. S. Townley, New York.

Alternate National Councillor: J. H. Hanna, Washington. Alternate Delegates: Harlow C. Clark, Newark; H. J. Kenfield, Chicago; M. B. Lambert, East Pittsburgh; L. H. Palmer, Baltimore; J. W. Colton, New York; E. C. Faber, Chicago; W. H. Sawyer, East St. Louis; Raymond H. Smith, New York; C. C. Peirce, Boston.

Maintenance of Equipment

Automatic Control for Compressor Built from Car Parts

A HOME-MADE device for automatically starting and stopping a GE-90, 50-hp. motor, driving an air compressor at the rock quarry of the Market Street Railway in San Francisco, has been giving effective service practically without repair for six years. Except for the small cylinder actuating the contactor switch, the mechanism was made up entirely from standard parts used on street cars and was therefore built without the purchase of any new equipment. The idea was developed by John L. Gaylord, now garage foreman for the company, who devised the automatic control to do away with the necessity for having an attendant at the compressor plant.

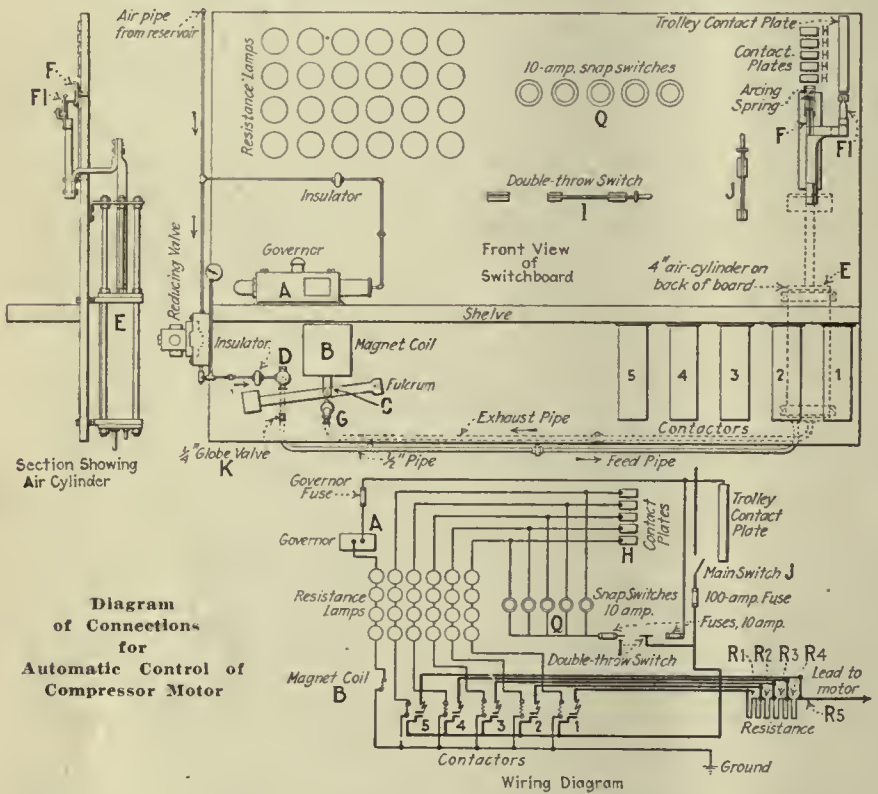


Diagram of Connections for Automatic Control of Compressor Motor

Drills in the quarry are supplied with compressed air from a reservoir, which in turn is served by a motor-driven compressor. As originally installed, except for starting and stopping, the compressor plant required no more attention than could be given at an inspection made once or twice a week. The motor, however, had to be started and stopped frequently to maintain the reservoir pressure between the desired limits of 100 and 85 lb. per square inch. Mr. Gaylord undertook to accomplish this automatically and did so successfully with the mechanism outlined in the accompanying diagram.

When the pressure in the air reservoir drops to a predetermined minimum the governor *A*, which is the ordinary device used for controlling the compressor motor on a street car, closes and energizes the magnet *B*. This raises the plunger and lever *C*, opening valve *D* and allowing air to flow into cylinder *E*. This raises the piston with the switch *F* and *FI* slowly across the contacts *HH*, allowing current to pass to contactors 1, 2, 3, 4, 5, which in turn gradually close the circuit to the motor and, by cutting out resistance gradually, start up the motor slowly. The valve *K* is used to regulate the speed of piston *E*, thereby eliminating the need of a dashpot or similar device.

When pressure in the air reservoir reaches the predetermined maximum the governor *A* is opened, current to *B* is shut off, plunger and lever *C* drops, valve *D* is closed and the opening of valve *G* allows air to exhaust rapidly from cylinder *E*, so that a spring in *E* forces the piston (and *F* and *FI*) down quickly, shutting off the current and stopping the motor. The valves *D* and *G* are those ordinarily used for controlling a compressed-air whistle line.

In case the current is suddenly shut off, the action of this mechanism opens the motor circuit the same as when the maximum pressure in the air reservoir is reached, and when the current again comes on the process of slowly starting up the motor automatically takes place. Should it be necessary to start up the motor when there is no pressure in the reservoir, the snap switches *Q* and the double-throw switch *I* are used until the reservoir pressure becomes great enough (about 20 lb. per square inch) to actuate the governor *A*. Ordinary 16-cp. carbon filament lamps are used for resistance.

Stop Warning Sign on Safety Car Doors

NUMEROUS accidents have been due to the fact that the door of the ordinary Birney safety car opens outward. Many an automobilist passing close beside a car, and not expecting it to stop, nor to have a door swing suddenly out in front of his machine, has crashed into the door and damaged it. The danger from this sort of accident was particularly great on the Valley Road line of the Public Service Railway of New Jersey until warning signs were placed on the cars.

Valley Road, Montclair, is a street of only moderate width and is traversed by a single-track trolley line with turnouts. Between a car on the turnout and the street curb there is scarcely room enough for an automobile to pass. If an attempt is made to pass a car with the door open an accident is almost sure to occur. Frequently the driver of the automobile, after smashing a safety car door, claimed not to have noticed that the door was open. As a result of this situation, George Schwetje, super-



"Stop" Warning Sign on Doors Prevents Accidents

visor of Montclair carhouse, made the suggestion that a large "Stop" sign be placed on the doors of safety cars where it would be readily visible to a motorist on the right-hand side of the car.

This sign is lettered in red on the glass of the rear half of the door just above the middle by a decalcomania process, at an almost negligible cost. When the door is closed it is inconspicuous, but when the door is opened at right angles to the side of the car, the word "Stop" stands out prominently before an approaching automobile driver. The Public Service Railway first tried the idea in the early summer of 1922, and more recently every safety car operated by the company has been equipped with the "Stop" signs on the doors. Since the inauguration of the scheme the company reports that not one single door has been knocked off safety cars operated in the Essex division.

Removing Pedestal Bolts

AN INGENIOUS apparatus has been devised in the shops of the Metropolitan West Side Elevated Railroad, Chicago, to facilitate the removal of pedestal jaw bolts. An especially designed yoke, a lever bar and a hydraulic jack are the parts comprising this apparatus. The yoke is forged out of 1⅛-in. x 1⅛-in. wrought iron with lugs welded on each side in order to hold the yoke centrally on the journal box. The lever bar is of an exaggerated D-shape construction forged out of 2-in. round wrought iron. Any conventional truck jack with a lifting lug near the bottom may be used in conjunction with this device.



Showing Apparatus In Position

As will be seen from the accompanying illustration, raising the jack will relieve the journal box pressure on the pedestal jaw bolts, allowing this bolt to be removed with ease. The advantage and feature of this new apparatus lies in the fact that it is a great labor saver. Previous to its installation the bolts were removed by placing a crowbar underneath the rim of the wheel and blocking up on the truck frame in order to form the fulcrum. Four or five men on the other end of the bar, which oftentimes had to be extended in order to make room for the men, would form sufficient leverage to depress the equalizing springs. Removal of the bolts by this new method has proved highly satisfactory, inasmuch as it can be operated by one man with extreme safety.

Forged Steel Fulcrums Replace Castings

THE cast steel brake fulcrums in use on the cars of the San Francisco Municipal Railway are not as satisfactory as another design made of forged steel which was developed in the shops of this system and which is being substituted for the older type as fast as renewals are required. Not only is the old design considered too light for the duty required, but, being a steel casting, when bent or broken by accident, the only repair feasible is by replacement of a new part. The new design is heavier and breakage is rare, but when damaged by collision, etc., the wrought iron plate can be heated readily and reshaped.

In making up the new design a 1 x 8-in. rectangular hole is first punched in a ½-in. steel plate 5 in. wide and 2 ft. long. The plate is then heated at its middle and the two halves are folded together around a 1⅛-in. diameter pin placed across the middle of the plate in the position to be occupied later by the fulcrum pin. To fasten the two halves rigidly together, without the necessity for drilling and bolting, an electric weld is made along each edge, thus uniting the two parts brought into contact by the fold.



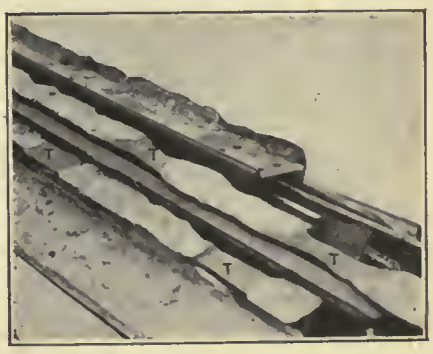
Brake Fulcrums Made from Steel Plates

One of the plates has about ¾ in. at the end bent up at right angles, to fit over the brake beam and give a firm hold against the pull of the brake rods. The fulcrums are firmly secured to the brake beams by three ⅝-in. bolts.

These new plates, designed by William C. Bendel, master mechanic of the San Francisco Municipal Railway, are not costly to build and have given such satisfactory service that they are now being specified on new equipment.

Rail Bases Destroyed by Corrosion

THE accompanying illustration shows the badly damaged condition of 8-in. T-rail bases after twenty-nine years of service on an electric railway system in the West. The corrosive action was most rapid in the part of the rail resting on the ties; the illustration shows two rails, bottom up, with points where the base rested on the tie marked "T." At these points the rail base had been eaten away, both in width and thickness, much more than at other sections. The part of the line from which these rails were removed was in filled ground which was always



Rails Eaten Away by Corrosion
Points marked T indicate bearing of rail base on tie. Action was more extensive at these points.

wet. Damage was fairly uniform all along a ½-mile double-track line.

Damage to the rail head and web was comparatively slight, the serious disintegration being confined to the base. These rails were taken out of service on account of the destructive corrosive action, i.e., neither the wear on the rail head nor the necessity for substituting another rail section would have required the removal of the rails at the time they were taken out of service.

Cutting Keyways for Small Diameter Shafts

TO CUT keyways in the ¾-in. holes in steel castings used for opening gates at the forward end of cars, William C. Bendel, master mechanic of the San Francisco Municipal Railway, uses a specially designed tool with which the keyway is punched on the hydraulic press.



Cutting Tool and Casting Slotted for Key
Cutting tool is at the left, with lower or entering end near the casting. The keyway in the casting shows in outline.

The tool consists of a ¾-in. shaft of case-hardened, cold-rolled steel, in which a slot carries a series of cutting teeth shaped to cut parallel to the axis of the shaft. After the hole is drilled in the steel casting, the end of the cutting tool shaft is inserted in the hole and pressure is applied to the upper end of the tool by the hydraulic press. As the tool moves downward the first tooth cuts a square cornered groove or keyway 3/32 in. deep and is followed by the second tooth, which increases the depth of the groove by a like amount, each successive tooth adding 3/32 in. to the depth of the keyway.

As an experiment the plan of speeding up the work by punching two castings at once was tried. This proved to be too great a strain on the cutting tool and two teeth were broken out near the top, as shown in the illustration. Since the break, however, the punching of single castings 1¾ in. thick has been done successfully with the tooth at the top making a cut 3/32 in. deep.

This method of slotting keyways has long been used in brass and bronze castings and the tool shown was made to apply the same idea in working the harder metal.

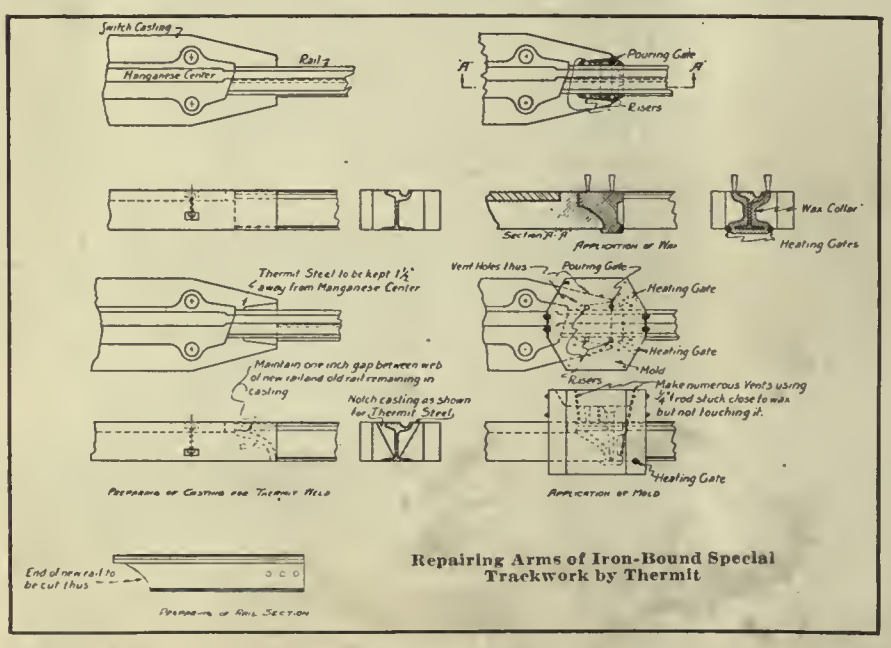
New Equipment Available

Repairing Arms of Iron-Bound Special Work

THE Metal & Thermit Corporation, New York, N. Y., calls attention to the method of making repairs to broken or loose arms in iron-bound frogs, mates or switches through the use of thermit welding. These repairs are made without removing the broken or loose parts from their location in the track. One or two yards of paving around the defective parts are removed and just enough concrete or paving foundation is cut out from under the rails to allow the application of mold boxes. A certain amount of the cast-iron metal is chipped away to permit the thermit steel to flow between the rail and the casting and thus to amalgamate with both parts. The accompanying illustration shows the required procedure for welding. The cost of repairs made according to this method have averaged as follows:

Thermit welding material, about	$30
Labor, about	20
Total	$50

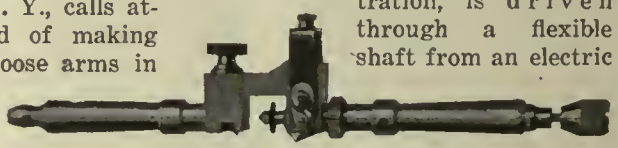
The quantity of material required, of course, depends to a considerable extent on the size of the rail and other circumstances. This method has been used in Joliet, Ill., and in Providence, R. I., with economical results.



Repairing Arms of Iron-Bound Special Trackwork by Thermit

New Type Commutator Slotter

THE Martindale Electric Company, Cleveland, Ohio, is marketing the "Imperial Undercutter," which is a new device for slotting commutators. The slotting machine, as shown in the accompanying illustration, is driven through a flexible shaft from an electric drill and may be purchased with or without the motor, as desired. The cutter sets in a recessed portion of the tool, and V-shaped milling cutters are used instead of the usual square-toothed saw. This produces a "V"-shaped slot which is recommended as being self-cleaning, and also avoids the necessity for scraping the strips of mica from along the edges of the commutator bars. A movable block with a guide for riding in the adjacent slot is provided at the left of the cutter, and a micrometer screw adjustment on the shaft of the cutter enables one to locate the cutter in the exact center of the mica. There is also an adjustable "V"-shaped rest for regulating the depth of the slot and to insure uniformity.



New Type Commutator Slotter

The handle shown at the left in the illustration is hollow, so as to permit the attachment of compressed air lines to blow away the dust from the front of the cutter and thus to enable the operator to see his work clearly at all times.

The News of the Industry

Transit Bills Pass

New York Senate Approves Reorganization of Public Service Commission and Five-Cent Fare Proposition

By a strict party vote the Democratic Senate passed on April 4 the Smith-Hylan New York City transportation bill, which now goes to the Republican Assembly for concurrence. Two other measures of the Governor's public utility series were also disposed of by the Senate.

The bill to reorganize the Public Service Commission by substituting a commission of three members, removable by the Governor, for the present five commissioners, who can be removed only by a two-thirds vote of the Legislature, and the Walker bill establishing a 5-cent fare in all cities throughout the State were passed and sent on their way to the lower house.

The transportation bill, which vests in the New York City Administration absolute control of the city's transit lines, including the right to own and operate bus and traction lines, was passed by a vote of twenty-six to nineteen. The vote for the bill reorganizing the Public Service Commission stood twenty-six to twenty. The five-cent fare bill was passed by twenty-eight to seventeen.

The New York County Republican Committee on April 3 declared that the city should control its transit contracts and construct its subways, that the state should continue to do the regulating and that the people should be spared the blight of municipal operation of subways and buses.

Henry H. Curran, chairman of the transit committee appointed by the county committee six weeks ago, read the report. Mr. Curran's committee makes the following recommendations:

1. That the whole of the public's power to agree with a transit company on a modification of a transit contract be vested in the city. This is home rule—and a 5-cent fare if the city so determines.
2. The planning and building, by contract, of new subways should be done wholly by the city. This breaks the deadlock between state and city that has stifled subway development.
3. Our city should be spared municipal operation of transit. This recommendation holds city government to its proper sphere of work, and insures the use of the city's limited funds for schools, parks, docks and other pressing needs. As to buses, the city has now and always did have the power to arrange responsible private operation of buses on the city's own terms.
4. The regulation of transit operation—a difficult, intricate work that is quasi-judicial in its nature and requires continuity of control—should remain in the Transit Commission. This leaves regulation where it belongs—a function of the state.
5. The Transit Commission should be retained, in particular, to perfect its plan for a city-wide and city-owned unification of our transit system as it now exists, for a 5-cent fare. By our first recommendation the plan may not be put into effect without the city's consent.

The policies thus announced are expected to guide the Assembly, which is Republican, in its handling of the New York transit legislation.

Pennsylvania to Have Public Utility Information Bureau

A movement has been started by the public utility companies operating in Pennsylvania to put their case more forcefully before the public. At a meeting at Philadelphia on April 4, it was the unanimous opinion of executive officers of the gas, electric light and power, water, electric railway and telephone companies that publicity was the most effective way to create and maintain cordial relations with the public.

Officials of all of the utility companies in Philadelphia and from Pittsburgh, Scranton and other cities and towns throughout the State attended the meeting. A temporary publicity committee was organized, with P. H. Gadsden, vice-president of the United Gas Improvement Company, as chairman. Among the railway men on the committee are C. B. Fairchild, Jr., of the Philadelphia Rapid Transit Company; and C. L. S. Tingley, second vice-president American Electric Power Company, the successor to the American Railways.

Mr. Gadsden said every large State in the Union, with the exception of Pennsylvania, has a committee functioning along the lines it is purposed to lay out for the Pennsylvania committee.

It is expected the committee will choose a director in the near future.

$4,000,000 Is Being Spent by Chicago Elevated Roads

Estimates of the cost of improvements contemplated by the "L" roads in Chicago this year in addition to ordinary expenditures, total nearly $4,000,000. The largest single item is for 105 new cars, at a total cost of $2,400,000, delivery on which is expected to begin early in May and be completed by fall. The cars will be placed in service as fast as they are received.

Some of the more important improvements and the estimated cost of each are:

New cars (105)	$2,400,000
Extending platforms for 8-car train operation	496,500
New Uptown Chicago Station, Wilson avenue	155,000
Roosevelt Road station and alteration of structure due to street widening	161,000
"L" share of alterations on account of new Union Station	137,500
Extension Douglas Park line to Oak Park avenue	60,000
Express tracks Wilson to Lawrence avenue	88,500
Alterations on Oak Park "L" for Ogden avenue widening	26,000
Total	$3,524,500

$52,000,000 Released for Subway Work

Governor Pinchot of Pennsylvania on April 3 signed the Daix bill which releases the "frozen money" held as unexpended balances of loans authorized for specific purposes under the Taylor rapid transit plans for Philadelphia.

Voters of Philadelphia, under provisions of the Daix bill, now will have the opportunity of deciding on transit projects. The situation heretofore was that $52,000,000 of bonds voted for transit improvement was earmarked in such a way the money was tied up so it could not be used except as had been directed under the plans adopted when A. Merritt Taylor was Director of City Transit.

The Mayor's comment follows in part:

> Apparently Council will have authority to cancel many of the authorizations for high-speed lines voted by the people in 1916. If the people wish to hold what they secured and now have in the way of authorizations and appropriations for such lines as the Broad Street subway and the extensions to League Island, Roxborough, Chestnut Hill, Germantown and Olney, they will have to fight it out with Council.
>
> That is about the way we view the situation here, and, of course, will take opportunity from time to time to keep the people advised.

Another development in the transit situation on April 3 was a conference attended by Mayor Moore, City Solicitor Smyth, Director Twining and A. Merritt Taylor, regarding high-speed transit problems. The part played by the Mayor in the conference was not made known by any of the parties present, but in view of the announcement made on his return that he intended "getting on" with transit plans and advertising bids for the Board Street subway by June 1, it is thought that an attempt was made by him to reconcile the differing views of Mr. Taylor and Director Twining through compromise.

Chicago Democrats Elect Dever Mayor

William Emmett Dever, Democratic candidate, was elected Mayor of Chicago on April 2 over Arthur C. Lueder, Republican nominee, by 103,748 plurality. Judge Dever carried all his associates on the Democratic ticket to victory. Thus Democrats now for the first time in many years are in complete control of the affairs of the second largest city in the United States.

Dever's plurality is the largest ever given a mayoralty candidate, except that of Mayor Thompson, who won his first victory in 1915 by a margin of 147,477. Mayor Dever will have the support of a Democratic City Council, the changes in that body giving the Democrats about four to one advantage. Dever is pledged to the following reforms:

Municipal ownership and operation of transportation lines, with immediate projection of an adequate subway system.
School board and schools to be taken entirely out of politics.
Erection of school buildings sufficient to provide every child with a seat, full time.

Some commentators on the result of the election profess to see in it the strengthening of William R. Hearst's influence upon the city government. It is understood that Mr. Hearst personally contributed $100,000 to Dever's campaign fund and the Democratic National Committee chipped in with $50,000.

Mayor William Hale Thompson's administration has been a constant target for several years. The Mayor will retire from office knowing his machine turned the city over to the Democrats and left his own party torn by internal dissentions that may not heal for years.

Municipal Operation of Staten Island Lines Attacked

Municipal operation of the Staten Island Midland Railway, under Grover A. Whalen, Commissioner of Plant and Structures of the city of New York was characterized as a complete failure by Alderman Bruce M. Falconer at the meeting of the Board of Aldermen on March 27.

The discussion of the railway came up when Commissioner Whalen requested the board to grant him another $50,000 revolving fund for the line. Since the city took over the line it was said that $450,000 has been sunk in it.

Mr. Falconer was quoted in part as follows:

It is two years and one month since the city acquired control of this railway. The trial of municipal operation which the Hylan administration purposes for all transit in this city, in this instance at least, has proved a complete financial failure. If the revenue is sufficient to maintain service, why does Commissioner Whalen come here asking for more money? His reports omit depreciation of rolling stock and equipment when anybody knows such allowance should be made. There is no reference to taxes that would have to be paid by a private operator. The amount of interest on city bonds is not mentioned, nor are the prospective damages in civil actions computed.

To this criticism Commissioner Whalen is said to have replied:

It is absurd to compare this road with any other in the world. It was defunct for years. It lost $30,000 in its last year of operation and paid no franchise tax to the city for the ten preceding years. It didn't meet any of its paving obligations to the city and the Hylan administration was forced to take it over, not by choice but on account of necessity.

The board voted to grant Mr. Whalen his requested funds.

Scranton Questions to Be Arbitrated

There will be five arbitrators to decide the wage and working conditions issues between the Scranton (Pa.) Railway and its employees. This was decided on March 31. The company was officially notified on that day of the action of the union in voting to accept arbitration as the counter proposal of the company. A draft will be drawn of exactly what phases of the matter are to be submitted to the board. Two arbitrators will be appointed by each side and the four thus selected will determine the fifth man. The men are asking an increase in wages of approximately 10 per cent.

Two Commissions in Detroit Make Joint Report

That the proposed system of subway dips in downtown Detroit as announced by the street railway commission is not satisfactory after a more thorough study by the rapid transit commission and the street railway commission, is evidenced by a joint report by the two commissions to Acting Mayor John C. Lodge. The following recommendations are made in the report:

1. That more immediate relief for surface congestion in the central area be obtained through further rerouting of lines in the downtown district.
2. That the rapid transit commission be specifically instructed to prepare its plans and program for the hub of a rapid transit system serving all of the six main arteries within the central business area.
3. That part or all of such hub plans as may be determined to be wise by the City Administration be submitted to the regular election this fall.

The proposed co-operative effort, and studies by the two commissions and their engineers will, the report stated, place in the hands of the City Administration, within a few months' time, sufficient engineering, legal, and financial data to make it possible to submit a definite rapid transit scheme to the electors of Detroit at the October election.

It is the street railway commission's determination to hold public hearings in the City Hall and discuss the needs of each district, according to Ross Schram, assistant general manager of the department, thereafter beginning work upon these extensions in the order of their immediate necessity, as shown during the hearings. For the sake of discussion, the various districts where extensions are required now or will be in the near future, are divided into eleven sections. This announcement was made in anticipation of the favorable result at the April 2 election.

In addition to these situations, the department plans to take care of out of its ordinary funds, a large amount of minor track changes necessary for rerouting, as well as improvements in downtown loading facilities required immediately, pending the approval of the plans for the subways.

Accidents Decreased in 1922.—In its publicity symposium, the "Truth," published in the daily papers, the Memphis (Tenn.) Street Railway calls attention to the fact that there were 124 fewer accidents in 1922 than in 1921; that outstanding litigation decreased 57 per cent, and that the claim cost was reduced. The number of new suits arising in 1922 showed a decrease of 36 per cent as compared with 1921. People are learning the advantages of dealing direct with the claim department to secure a prompt settlement of just claims.

New Chicago Executive Starts Off on the Right Foot

After G. A. Richardson, recently appointed vice-president of the Chicago Surface Lines, had been filling his new position for a month, he issued a statement to all of the employees on the property, which has met with a very warm reception. The *Union Leader*, official publication of the street carmen's union in Chicago, has referred to the message of the new operating head in most kindly and complimentary terms. In discussing his reference to the need for effective team work, this paper said:

No group of workers realizes the value of team work so well as the organized group. The expression of the new operating executive indicates a progressive viewpoint in aiming to establish the kind of relations necessary to bring proper results, and with this spirit continued and a just regard for the interests of all maintained there is every reason to believe that the team work suggested by Mr. Richardson will find generous response from the employees.

Mr. Richardson pointed out to the employers that "there is no intention on my part of trying revolutionary methods. Like all of those identified with the property I have but the single desire to assist in developing the surface lines to the highest efficiency in service. Perfection in a property may not be possible, but improvement is always possible, and that is what we want to work for here."

In commenting on this thought, the union paper stated that it represented "a healthy indication of the broadening viewpoint of up-to-date executives in the electric railway business." On this point the editorial said:

Too often in the past the man accepting an executive position in the electric railway business, eager to make a showing, has wrecked his opportunities for service by attempting innovations that were unfitted for the environment, and therefore proved impracticable. In many cases these innovations have been arbitrarily established, with detriment to the interests he represented.

Mr. Richardson had some comments to make on courtesy:

In our business, as in others, one of the most valuable assets is courtesy—and courtesy is also the best evidence of a man's good faith in making for the company's success. Answering questions pleasantly; exercising care in insuring the safety of those boarding and leaving cars; being careful not to run by waiting passengers; courteous explanation in cases where transfers appear to be irregular; a little bit of help now and then to the aged and infirm—all of these things are easy to do, and they form the very foundation of successful public service.

The *Union Leader* pointed to this paragraph as one of the things which the Amalgamated Association and its official journals have continually emphasized. Its final characterization of the message of the new vice-president was that it "is a common sense, practical talk. It carries neither ice nor sugar and is free from the formal stiffness that marks the usual pronouncements of this character. It will be accepted in good spirit by the employees, and so long as Mr. Richardson shows a disposition to maintain just relations, he will find the members of Division 241 doing their share to bring about the fullest measure of team work to produce a service that will be beneficial to all interests concerned."

Electors Approve Franchise Amendment

The voters of Jackson, Mich., on April 2 approved an amendment to the grant of the Michigan United Railways which will mean a cancellation of the obligations on the part of the company to do future paving between tracks. As a result of the vote paving will be done between the tracks and 18 in. to either side by the Michigan United Railways on West Ganson Street at a cost of $61,000, and Page Avenue will also be paved at an estimated cost of $80,000.

John F. Collins, vice-president, general manager and receiver of the company, was recently granted permission by Judge Simons in the District Court to borrow $141,000 for these paving jobs provided the amendments to the charter were adopted in Jackson. The proposal of the company, which was in the form of a binding contract approved by the Federal court, was that the company would borrow money and increase its investment in Jackson $141,000 on condition that when Ganson, First and Page Avenue were fixed up the company would not thereafter be bound by franchises and ordinances to pave between the tracks of its city lines.

Can Youngstown Afford Railway and Jitney Service

The Youngstown (Ohio) *Vindicator* has raised the question: "Can Youngstown afford both street car and jitney service?" In concluding a long editorial that paper said:

> The question must be faced squarely. Youngstown cannot go on letting the jitneys run wild and the railway pile up a deficit every month. If that condition continues we shall soon have no street cars, and the jitneys, of course, do not pretend to meet our transportation needs. They take only the cream and leave the railway the unprofitable business. The only way the company can get back on its feet is to reduce fares and get more passengers. But there will always be riders who will pay 10 cents for a jitney ride even though the jitney keeps the railway car fare high and prevents others from riding at 6 or 7 cents.
>
> This is the situation. Does Council have the brains and the courage to lift us out of it? And will the city back Council in a manly search for a solution?

Texas Governor Kills Bill to Permit Bus Operation by Railways

Governor Neff of Texas has vetoed the bill which was passed by the Legislature at its recent session authorizing electric railways and interurban lines to operate motor buses. Under the provisions of the bill city railways, suburban or interurban lines would be permitted to acquire, own, maintain and operate automobiles, automobile buses and automobile bus lines for the transportation of passengers or property, and to be so authorized in future charters.

The Governor used this language in its disapproval:

> The public policy of the state of Texas has been to restrict private corporations or quasi-public corporations to be incorporated for one purpose. The enlargement of the powers of a railway or an interurban railway as provided in this bill is an infringement of this public policy, as declared by our laws, and should not be allowed unless the benefits to the public are self-evident.
>
> The permission for a city railway or an interurban railway to own, maintain and operate automobiles, automobile buses and automobile bus lines, as given in this bill, is an extension of corporate power that would permit the strangling of competition and ownership of independent bus lines. This measure, to say the least, has in it many potential objections.

Mr. Doremus Elected Detroit Mayor

$17,000,000 in Bonds Authorized for the New Railway Work and for the Construction of Power Plant

Frank E. Doremus was elected Mayor of the city of Detroit on April 2 by the largest majority in the history of the office, defeating Dr. James W. Inches, former police commissioner. Mr. Doremus, former congressman from the Detroit district, had outlined his policy towards municipal ownership and asserted that the application of horse-sense and patience was essential in handling the matter. Unofficial returns indicated that Mr. Doremus received 89,391 votes to 34,649 cast for Dr. Inches. The vote cast, a little in excess of 124,000, fell behind the vote of 1920 and 1921, but exceeded that of the spring election of 1922.

The $5,000,000 bond issue for extensions and improvements to the municipal railway, twice rejected at previous elections, and also the $12,000,000 bond issue for the construction of a municipal power and lighting plant, were carried. More than three quarters of the output of the new power plant will be supplied to the railway.

Pleased Over Passage of Bond Issue

Mr. Doremus expressed himself as pleased that both bond issues had carried although he did not campaign for them. He will take office about April 10, depending upon the time at which the official count of the ballots is made. The new Mayor will have to run for office again in the fall as the April 2 election for Mayor simply filled the vacancy caused by the resignation of former Mayor Couzens to become United States Senator.

As pointed out before the election, the $5,000,000 provided by the bond issue will be expended for extensions to existing street railway lines and in the purchase of 200 additional new cars. The $12,000,000 for a power plant will not all be made available at one time as it is estimated that $2,000,000 will start the project and supply the first year's needs. It has been cited that failure to provide for the power plant would have threatened the present low fares on the municipal lines. A very large saving is expected to accrue to the city annually by supplying its own power as compared with the cost of purchased power when the present contract rates for power have expired.

Both bond issues required a 60 per cent majority. The street railway issue received 61 per cent and the power plant bond issue received 63 per cent.

Substitute Bill to Be Introduced in New York

A dispatch to the ELECTRIC RAILWAY JOURNAL from Albany on the afternoon of April 6 said that Assemblyman George N. Jesse, Republican representing the twenty-third district, New York City, will introduce on Monday night, April 9, in the New York State Legislature the Republican substitute bill regulating utility matters in the city of New York. The measure will restore to the city of New York the right to enter into contracts and franchise agreements with operating corporations, to regulate the rate of fare to be charged and to build and own transit facilities, but will reserve to the state Public Service Commission control over service and capitalization. Assemblyman Jesse has confidence that his substitute measure will pass the lower house and will, in general, be accepted by the Democratic Senate.

Further amendments to the Public Service Commission Law will be offered from the Republican side of the House restoring to municipalities the right to enter into contracts and franchise agreements with local corporations, but will reserve to the State regulatory body supervision over service and capitalization. There is little disposition at the present session of the legislature to change the personnel or manner of appointment of the present State Public Service Commission.

New Wage Scale Being Planned

Employees of the Community Traction Company, Toledo, Ohio, are seeking a new wage scale to replace the present agreement which expires on May 21. The present scale for trainmen is 45 cents an hour up to three months service, 47 cents for the next nine months service and 50 cents thereafter. It is expected that the new contract will be ready to submit to the officials of the company by April 20.

Men Seek New Wage Agreement.—Members of the union recently voted to appoint a wage committee to draw up a new wage schedule with the Boston (Mass.) Elevated Railway. The present scale expires on July 1.

Men Discuss Wage Agreement.—Railway employees of the Cumberland County Power & Light Company, Portland, Me., have had under discussion new working conditions and wage schedules. The present agreement expires on May 1. Last year the men voluntarily accepted a wage cut.

Wages Increased Five Cents an Hour.—Beginning April 1 trainmen of the Harrisburg (Pa.) Railways were to receive a wage increase of 5 cents an hour. First year men will be paid 48 cents an hour, second year men 49 cents and employees who have served more than two years will receive 50 cents an hour.

Financial and Corporate

$13,827,583 Residue Receipts

Revenues of the Chicago Surface Line Decline with Decrease in Fares —Operating Expenses Also Reduced

MANY interesting features, both financial and physical, are presented in the ninth annual report of Henry A. Blair, president Chicago Surface Lines, to the board of operations. During the year ended Jan. 31, 1923, the system carried 762,629,211 revenue passengers, as compared with 750,515,622 the previous year.

Throughout the fiscal year ended Jan. 31, 1922, an 8-cent fare was in effect on account of a Federal injunction against the order of the Illinois Commerce Commission. The case was reopened and the fare ordered reduced to 6 cents, effective May 1. This order also was held up by the Federal court, the award being on condition that the companies not later than June 15 should charge not to exceed 7 cents, with three tickets for 20 cents and 3-cent cash fares for children between seven and twelve years of age. The fare was reduced June 15, 1922, in accordance with this award. The original order called for the sale of the tickets by conductors on the cars, but this has since been modified, so that tickets are obtainable only at certain designated agencies. This reduction in fares caused a decrease in total revenue from $60,343,733 in 1922 to $56,103,062 in 1923. Expenses were reduced from $46,516,150 to $44,416,070, leaving residue receipts, after taxes and reserve for renewals, of $11,686,992 for the past year, as compared with $13,827,583 for 1922. Complete figures are shown in the accompanying table.

CHICAGO SURFACE LINES

Earnings, Expenses and Division of Residue Receipts for Twelve Months Ended Jan. 31, 1922 and 1923

	1921-1922	1922-1923
Earnings		
Passenger cars (inc. mail carriers)	$59,706,413	$55,495,311
Chartered cars	12,121	9,594
Newspaper cars	16,161	15,868
Freight earnings	2,318	1,864
Hospital car service	4,194	5,078
Advertising	247,184	253,678
Rents of buildings, etc.	106,479	100,240
Sale of power	92,371	89,341
Interest on deposits	137,939	119,033
Miscellaneous	18,553	13,055
Gross earnings	$60,343,733	$56,103,062
Expenses		
Way and structures	$ 3,040,940	$ 2,556,627
Equipment	4,348,373	3,788,171
Renewals	4,827,499	4,488,245
Power maintainance	320,375	316,450
Power operation	3,128,792	3,175,391
Conducting transportation—trainmen	21,574,699	19,662,636
Conducting transportation—other	3,208,603	2,912,780
Traffic	34,547	42,093
General and miscellaneous—damages	2,271,224	2,356,329
General and miscellaneous—other	1,568,098	1,859,348
Taxes	2,193,000	3,258,000
Total expenses	$46,516,150	$44,416,070
Residue receipts	*$13,827,583	*$11,686,992
Divided:		
Chicago Railways—60 per cent	* $8,296,550	*$7,012,195
South Side Lines—40 per cent	* 5,531,033	* 4,674,797

*Includes city's 55 per cent of net divisible receipts, as defined by ordinances.

Substantial reductions in expenses were made in way and structures, equipment and power maintenance and in conducting transportation. The renewal fund, which represents 8 per cent of the total gross revenues, was proportionately reduced. Power and damages were higher, presumably on account of the greater car mileage run.

The 80-cent wage scale for trainmen, which had been in effect since June 1, 1920, was reduced 10 per cent, effective Aug. 6, following a strike of the trainmen which tied up the system for six days. A similar reduction in pay was made in other departments.

During the year a number of applications were made to the Illinois Commerce Commission for authority to establish motor bus lines in the city. The commission took the following stand: "In the consideration of motor bus transportation the commission should be cognizant of the fact that it could not be considered to be for the public convenience and necessity of either the whole people of the city of Chicago or those persons immediately dependent upon the surface or elevated lines for transportation that bus line service should be instituted which would either seriously impair the service of present lines of transportation or would ultimately destroy this service entirely."

Betterments of service growing out of the special transportation studies made by John A. Beeler have continued with good results. Investigations by experts within the company's organization are going forward with a view to making improvements in the service and at the same time effecting better economic results.

New Track Constructed

During the nine years of unified operation the companies have constructed 96.56 miles of new single track, at a cost, including paving and overhead, of $4,532,639, and they have reconstructed 399.18 miles at a cost, exclusive of overhead structure, of $18,389,615. The changes in mileage during the year are as follows:

Total miles single track Jan. 31, 1922	1,061.32
Extensions	0.56
Abandoned	0.98
Reconstructed	33.48
Total miles single track Jan. 31, 1923	1,060.90

In connection with work during the year the company laid or renewed 160,831 sq.yd. of paving, principally granite block, which cost approximately $558,048. During the nine-year period of unification the companies have expended for paving the sum of $5,157,882. Additional paving laid in maintenance was 156,840 sq.yd., costing $531,118.

During the year there were 11,843 wreck wagon calls, of which 56 per cent originated from blockades caused by breakdowns of wagons and trucks on the tracks, fires and other causes apart from car operation.

All power is purchased from the Commonwealth Edison Company under contract. For the year the amount purchased (a.c.) was 546,507,077 kw.-hr., which was converted into 499,875,623 d.c. kw.-hr., the difference representing the loss in conversion. The total cost of the energy at the d.c. busbar is given as $4,507,523. This includes operation maintenance, fixed charges and purchased power. Some of these items are not shown separately in the earnings statement.

Changing the trolley wire from 00 to 000 has helped reduce the number of breaks and consequent delays to traffic.

Car Failures Reduced

The number of out-of-order cars pulled in averaged 1,563 per month, compared with 1,961 the previous year, a decrease of 20.3 per cent. During Christmas week over 96 per cent of the cars were available for service.

During the year there were authorized forty-five double-truck one-man cars, to be built at the company's shops; 100 double-truck four-motor cars to be built by outside manufacturers, and sixty-nine double-truck four-motor cars to be built at the company's shops. This last order is to replace a part of the cars lost in the Devon Avenue carhouse fire.

The company spent $691,314 in general overhauling of cars. The total rolling stock on the system now consists of 3,198 passenger cars, 486 work cars and service cars and three locomotives.

The average daily passenger receipts for the year amounted to $154,583, the highest day being Saturday, April 15, when $191,403 was taken in.

A table is included showing names and dates of employment of all persons connected with the company forty years or over. There are ninety-nine of them, including John M. Roach, who is the oldest in point of service, having been with the company and its predecessors since 1872. The number of employees in continuous service for twenty-five years or over is 1,922.

The purchase price of the company, in accordance with the city ordinance, was $160,944,226 at Feb. 1, 1923, as compared with $160,610,561 the previous year.

By the terms of the ordinance, 8 per cent of the gross revenue is reserved for renewals. For technical reasons, a special renewals and equipment fund has been created during the past few

years. The condition of the reserve funds is as follows:

RESERVE FOR RENEWALS	
Balance in reserve at Feb. 1, 1922	$11,845,768
Sale of unnecessary property and salvage	159,629
Interest earned	360,724
Balance in reserve at Feb. 1, 1923	$12,366,121

SPECIAL RESERVE FOR RENEWALS AND EQUIPMENT	
Balance in special reserve at Feb. 1, 1922	$ 310,562
8 per cent of gross earnings	4,488,249
Interest earned	34,555
Total	$ 4,833,366
Less: Expended for renewals	2,968,431
Expended for new passenger cars	243,367
Total expended	$ 3,211,798
Balance in special reserve at Feb. 1, 1923	$ 1,621,568
Total balances at Feb. 1, 1923	$13,987,689

This balance is in cash, and is on deposit in various banks.

Under the terms of the ordinance, the residue receipts of the company are divided, 60 per cent, or $7,012,195, going to the Chicago Railways and 40 per cent, or $4,674,797, going to the South Side lines.

CHICAGO RAILWAYS COMPANY REPORT

The report of Henry A. Blair, president Chicago Railways, shows the following distribution of the residue receipts for the year ended Jan. 31, 1923:

Chicago Railways' share (60 per cent) of residue receipts		$7,012,195
Deduct joint account expenses		360,000
		$6,652,195
Deduct 5 per cent interest on capital valuation		4,630,943
Income divisible with City of Chicago		$2,021,252
Chicago Railways' 45 per cent of divisible income		909,563
Five per cent interest on capital valuation		4,630,943
Other income		249,956
Total income		$5,790,462
Interest on bonds	$4,716,680	
Interest on loans	94,785	
Sinking fund	250,000	
Other deductions	173,712	
		5,235,177
Net income		$555,285

The net income of $555,285 is before payment of adjustment income bond interest and before providing for Federal income and excess profits taxes for 1922, or for any additional Federal taxes for prior years.

For the year the rate of return upon the company's capital investment, or city purchase price, was 5.98 per cent; the average rate of return on the purchase price required to meet fixed charges, including sinking fund, is approximately 5.5 per cent.

Because of the inability of the company to finance any of its securities during the year, capital expenditures were restricted as much as possible. The city purchase price at Jan. 31, 1922, was $92,518,537, and capital additions during the year were $180,320, making the purchase price at Jan. 31, 1923, amount to $92,698,857. This value applies to a track mileage of 585.6, which is substantially the same at the beginning and the end of the year.

Further financial and operating statistics contained in this report are given in connection with the Chicago Surface Lines' report.

In conclusion Mr. Blair states: "The vital question now concerning the people of the city of Chicago is that of improved transportation. The most zealous efforts and earnest co-operation of all interests—the people, the city authorities and the companies — are absolutely essential to a speedy and proper solution of this problem."

CHICAGO CITY RAILWAY REPORT

The report of Leonard A. Busby, president, to the stockholders of the Chicago City Railway for the year ended Jan. 31, 1923, shows the earnings, expenses and residue receipts of the Chicago Surface Lines under unified operation and the income account and balance sheet of the Chicago City Railway.

Of the residue receipts of the Chicago Surface Lines 40 per cent, or $4,674,796, went to the South Side Lines, namely, the Chicago City Railway, the Southern Street Railway and the Calumet & South Chicago Railway.

A comparative statement of gross earnings, operating expenses and residue receipts for the past two years follows:

CHICAGO SURFACE LINES	1922-23	1921-22
Residue receipts	$11,686,992	$13,827,583
Deduct:		
City's 55 per cent.	$1,665,205	$2,944,963
Joint account expenses	620,000*	449,000*
Net receipts	$9,401,785	$10,433,619
Operating ratio	79.17%	77.09%
Return on city purchase price	5.842%	6.501%

*Income taxes and other ordinance deduction.

After payment of operating expenses and bond interest, the property of the Chicago City Railway produced a net income of $1,458,247, a decrease from last year of $301,681. Four quarterly dividends of 1½ per cent each, or 6 per cent on the $18,000,000 of capital stock were paid, amounting to $1,080,000. The remainder of the net earnings amounting to $378,122 was carried to surplus, which at the close of the year amounted to $1,917,733. During the year the company paid off $286,000 of its loans, which represented capital expenditures in previous years.

Capital expenditures during the year amounted to $210,923, but there was a decrease of $75,631 in the material and supplies, carried in capital account, in accordance with the ordinance under which the company operates. This tended to reduce, by this amount, the charges to capital account during the year, leaving net capital charges of $135,291, making the purchase price at Jan. 31, 1923, $55,084,943.

Mr. Busby says that the officers of the company are firmly of opinion that a unified system of surface, elevated and subway lines, in substantial conformity with the physical plans and recommendations of the Chicago Traction and Subway Commission report of Dec. 15, 1916, is necessary, in order to work out a practical and satisfactory solution of the problem of furnishing adequate local transportation facilities for Chicago.

INCOME ACCOUNT OF THE CHICAGO CITY RAILWAY FOR THE YEAR ENDED JAN. 31, 1923		
40 per cent of the residue receipts of Chicago Surface Lines		$4,674,796
Deduct: Joint account expenses, interest on capital investment of the Chicago City Railway, Calumet & South Chicago Railway and Southern Street Railway		3,668,400
Net earnings of South Side Lines		$1,006,396
City's 55 per cent as per ordinances		553,518
South Side Lines' 45 per cent as per ordinances		$452,878
Less: Southern Street Railway proportion, as per ordinance		24,908
Company's proportion		$427,970
Add: Interest on capital investment		2,750,964
Income from operation		$3,178,934
Other income		54,398
		$3,233,332
Interest on bonds and notes outstanding		1,775,085
Net income		$1,458,247
Add: Surplus at Jan. 31, 1922		1,539,611
Surplus		$2,997,858
Dividends, 6 per cent	$1,080,000	
Miscellaneous	124	1,080,125
Surplus at Jan. 31, 1923		$1,917,733
Percentage of net income to capital stock at par		8.10 per cent

Contract Creditors to Be Paid in Full

On March 10 the committee representing the contract creditors of Richmond Light & Railroad Company, Staten Island, N. Y., addressed a letter to the company's creditors announcing the formation of the committee. Prior to the preparation and sending out of this letter, the committee had caused an investigation to be made of the status of the contract claims against the company. The information so secured led it to believe that the formation of the committee was necessary for the protection of the rights of such creditors. George M. Judd, chairman, says now that the committee has since been advised by the Richmond Light & Railroad Company that it is the intention of the company to pay its contract creditors in full. The misunderstanding with respect to the status of these claims having been cleared up, the committee feels that the purpose for which it was organized has been accomplished and that there is no further need for its activities. It is accordingly dissolving. Control of the utility passed last October to a banking group in which J. G. White & Company are interested. J. H. Pardee of the White company is president of the Richmond Light & Railroad Company.

Interurban Report Shows Improvement

The Terre Haute, Indianapolis & Eastern Traction Company has filed its report for 1922 with the Public Service Commission of Indiana. It shows an improvement in the company's business as compared to 1921. The main figures of the income report for the year 1922 are:

Railway operating revenue.....	$3,975,795
Railway operating expenses....	2,943,396
Net revenue from railway operations	$1,032,398
Auxiliary operating revenue....	1,761,963
Auxiliary operating expenses...	1,125,247
Net revenue auxiliary operations	$ 636,715
Total net operating revenue.....	1,669,114
Less taxes	366,725
Leaving as operating income....	$1,302,388
Plus non-operating income.....	190,002
Making the gross income.....	$1,492,391

The company paid in interest on its funded debt $300,281. It paid in amortization of bond discount on the funded debt $61,485. The lease rental, bond interest and amortization items total $1,052,008, which leaves a net income balance of $440,383 for the year. This is $138,865 more than the net income on the same properties in 1921. Dividends amounted to $234,958.

Deductions from gross income in the form of rent of leased roads, interest on funded debt and amortization, already referred to and amounting to $1,052,008, left $440,383, as the income balance for the year.

The auxiliary operating revenue given in the table includes $1,214,796 for the light and power department of Terre Haute, $546,385 for the West Tenth Street power plant in Indianapolis and $781 for arcade steam heat in Terre Haute.

The report shows that 22,444,565 regular fare passengers were carried in 1922; that investment in road and equipment of the T. H., I. & E. at the end of 1922 was $15,897,323, and that unmatured funded debt of the T. H., I. & E. amounted to $5,812,750.

The Terre Haute, Indianapolis & Eastern Traction Company owns and operates 420 miles of electric railway in Indiana and 10 miles in Illinois.

The report shows that it paid in 1922 as rent for leased roads $690,241. This amount includes $447,283 of guaranteed bond interest, $234,958 of guaranteed stock dividends and $8,000 of cash guaranty for maintenance of organizations of the leased properties.

Change in Capital Structure Proposed

The stockholders of the Public Service Corporation of New Jersey on April 2 approved the plans recently announced by the company's directors for the changes in the corporation's capital structure. The plans call for the change in the present authorized common stock from $50,000,000 of $100 par to 2,000,000 shares of no par stock and for the exchange of the old common for the new on the basis of two new shares for one old one. The preferred stock capitalization will be increased to $100,000,000 of authorized preferred stock, divided into 250,000 shares of 8 per cent cumulative preferred, 500,000 shares of 7 per cent cumulative preferred and 250,000 shares of 6 per cent cumulative preferred.

Abandonment of City Lines Will Be Requested

In a communication to the City Council of Wheeling, W. Va., M. R. Stern, general manager of the Wheeling Public Service Company, notified that body that in the near future the company plans to ask the West Virginia Public Service Commission for permission to abandon all lines of the City Railway with the exception of the Mozart division. The lines do not pay.

It is proposed to give transfers from the lines of the Bus Transportation Company to those of the Wheeling Traction Company. It was the original intention of the City Railway to accept and to give transfers to and from the lines of the Bus Transportation Company. The transfer arrangement will be carried out under the same price arrangement as originally designated by the City Railway and the Bus Transportation Company. In addition the Wheeling Traction will have a transfer arrangement with the Mozart division.

I. T. S. Merger Approval Asked

Approval was asked on March 31 for a consolidation of the Studebaker utility interests represented by the Southern Illinois Light & Power Company with the properties of Senator William B. McKinley, known as the Illinois Traction System, in a petition filed with the Illinois Commerce Commission.

As indicated previously in the ELECTRIC RAILWAY JOURNAL it is proposed to consolidate these properties under the name of Illinois Power & Light Corporation. The petition states that as a result of carrying out the new plan many different issues by which the properties are now financed will be superseded.

The formal offering of the $30,000,000 of first and refunding mortgage 6 per cent Series A bonds of the Illinois Power & Light Corporation was made on April 3 at a price of 98½ and interest to yield 6.10 per cent. The banking circular discloses that Clement Studebaker, Jr., and associates, through the medium of the North American Light & Power Company, are acquiring a controlling interest in the corporation. The banking group which is underwriting the bonds provided for in the financing plan includes, among others, E. H. Rollins & Sons, Harris Trust & Savings Bank, Halsey, Stuart & Company, Spencer Trask & Company, Blyth, Witter & Company, Marshall Field, Glore, Ward & Company of Chicago and New York and Bodell & Company, Providence.

New Haven Trolleys Doing Well

The *Wall Street Journal* says that the earnings statements of the electric railways controlled by the New York, New Haven & Hartford Railroad will be an encouraging feature of the annual report of the steam railroad to be published on April 18. According to that paper the six electric railways had gross revenues of $24,106,049 in 1922, a decrease of $222,915, or less than 1 per cent, from 1921. Despite this slight loss in gross revenues, the net income of $2,071,465 was an increase of $875,878, or 73 per cent, over 1921. Worcester Consolidated Street Railway alone showed an increase in revenues, $4,399,396, against $4,390,878 the year before. The Springfield Street Railway, Connecticut Company, New York & Stamford Railway, Westchester Street Railroad and Berkshire Street Railway had smaller gross. The net income of the six companies, for 1922, 1921 and 1917, follows:

	1922	1921	1917
Worcester Con. Ry....	$492,298	$375,828	$38,105
Springfield St. Ry.	451,754	264,766	*133,179
Connecticut Co.	1,310,415	725,926	619,848
N. Y. & Stamford Ry...	*18,979	14,744	*59,018
Westchester St. Ry.....	*15,437	*55,678	*106,989
Berkshire St. Ry.	*148,587	*129,988	*234,361
Total net income ..	$2,071,464	$1,195,598	$124,406

*Net deficits.

The Worcester Consolidated Railway paid $450,000 in preferred dividends last year and Springfield Street Railway paid $232,735, compared with $139,641 the previous year. None of the others made dividend payments.

Bond Maturity Extension Authorized

Receiver E. Stenger of the Denver (Colo.) Tramway has been authorized by the Federal District Court to extend to April 1, 1924, the maturity of $788,000 first mortgage 5 per cent gold bonds of the Denver Tramway Power Company which will become due on April 1, 1923, and to offer the holders in return for their consent an increase in the interest rate to 6 per cent. In presenting his petition Receiver Stenger stated that there was not a sufficient amount of money on hand to pay the principal of these bonds, but that the sinking fund instalment of $50,000 and the April 1, 1923, interest coupon could be provided for. Holders of these bonds have been notified of the action taken by the court and will have until April 1, 1923, to deposit their bonds as evidence of their acceptance of the plan. The Guaranty Trust Company of New York City and the International Trust Company of Denver will act as depositories.

The present lien and security of the extended bonds will continue unimpaired as they are secured by a mortgage on the power plant of the company. The original issue of the bonds was for

$1,500,000, but this has been reduced to $788,000 through the operation of the sinking fund and a further reduction of $50,000 will be made on April 1, 1923. The interest on these bonds, which are one of the underlying issues, has been paid regularly during the receivership.

$2,100,000 of Preferred Stock for Employees and Customers

At a meeting of the department heads from all divisions of the Wisconsin Public Service Corporation, Green Bay, Wis., plans were discussed for the distribution of $2,100,000 of 7 per cent preferred stock among employees and customers of the corporation in the territory served. The proceeds of this stock issue will be used to pay for additional light and power, street railway and interurban, gas, and hydro-electric improvements and extensions. The slogan of the program is "Be a Partner." It is intended not only to give every employee and customer an opportunity to buy an interest in the company, but also to encourage thrift by the saving arrangement. The employees are to be given the first opportunity to buy this stock between the dates of March 26 and April 6, after which the sale to the public will be held, from April 7 to April 21.

Another Move Toward Ending Pittsburgh Receivership

Judge W. H. S. Thomson in the Federal Court at Pittsburgh, Pa., has directed Special Master Henry G. Wasson to file an opinion with the court on the report of the receivers of the Pittsburgh Railways and their request to be discharged. The court also directed that creditors be notified and a hearing held so as to get all possible information on the financial condition of the company. This action is probably the last formal step prior to turning the railway properties back to the stockholders.

Will Apply for Rehearing on Issue of Securities

The Lima-Toledo Railroad will no doubt apply for a rehearing in the matter of its petition to the Public Utilities Commission of Ohio for authority to issue $2,750,000 of securities with which to purchase the interurban railroad extending from Lima into Lafayette Street, Toledo, formerly owned by the Ohio Electric Railway.

The evidence established beyond question that this railroad was of the physical value of more than $3,500,000, about $750,000 in excess of the securities which the company asked to issue for purchase of property.

The Public Utilities Commission at the preliminary hearing indicated in an opinion that notwithstanding that the value of the property was in excess of the amount of securities, it had been sold for less at judicial sale, and because its earnings might not possibly support a return upon $2,750,000, the authority to issue the securities would be refused.

In the event that the commission at a rehearing still refuses the authority the only course then open to the company would be an appeal to the Supreme Court of Ohio.

Auction Sales in New York.—At the public auction rooms in New York there were no sales of electric railway securities this week.

Two Months Net Equals $205,921.—For the two months ended Feb. 28, 1923, the Market Street Railway, San Francisco, Calif., realized a railway operating revenue of $1,531,266. Operating expenses amounted to $1,114,983. The net income for the two months was $205,921.

Railway Shut Down.—The Aberdeen (S. D.) Railway has disposed of the last of its equipment and has been replaced by the Motor Transit System. Up to July, 1922, the railway had been operating for nearly twelve years, but the company was losing money and the voters were called upon to decide whether the city should buy the property and operate it. The result was against municipal ownership.

Dividends Declared.—At a meeting of the directors of the Charlottesville & Albermarle Railway, Charlottesville, Va., held recently, a dividend was declared for the year on the 7 per cent cumulative preferred stock, payable 1¾ per cent on March 31, June 30, Sept. 30 and Dec. 21. A dividend of 2½ per cent was declared on the common stock of the company for the quarter ending March 31 payable on March 31.

Preferred Stock Offered to Yield 7.57 per Cent.—Paine, Webber & Company, New York, N. Y., are offering 3,500 shares Wisconsin-Minnesota Light & Power Company cumulative 7 per cent preferred stock. This issue is priced at $92.50 per share, to yield about 7.57 per cent. The Wisconsin-Minnesota Light & Power Company serves a population in excess of 800,000 in La Crosse, Eau Claire and Chippewa Falls, Wis., and Red Wing and Winona, Minn., and sixty-eight other communities. Included in the system are 25 miles of electric railway.

Property Sold At Auction.—Sale of the Gallipolis & Northern Traction Company's property was made at public auction at Gallipolis, Ohio, recently. The property consisted of electric cars, and rails extending from Gallipolis to Kanauga, together with other minor equipment. The Goldberg Iron & Steel Company of Columbus, Ohio, became the purchaser. There were four bids, $8,000, $8,025, $8,100, and $8,110. The minimum price for which the property could be sold was $8,000. The purchaser is engaged in the scrap iron business and a statement was made immediately after the sale that the property would be junked.

Gross Revenues Fall Off.—The gross operating revenues of the railway department of the San Joaquin Light & Power Corporation for the year 1922 amounted to $123,168, against $137,511 for 1921.

Directors Re-elected in Boston.—Stockholders of the Boston (Mass.) Elevated Railway held their annual meeting in Boston on April 2 and voted to ratify the acts of the directors during the year. The seven directors were re-elected. The road is being operated by the board of public trustees, with Edward Dana as general manager, so that the work of the directors is more or less perfunctory.

Auction Sale Because of Tax Arrears.—The power house and carhouse of the Northern Massachusetts Street Railway in Templeton, Mass., together with the land upon which they are situated, will be sold at public auction at the office of Tax Collector Carleton A. Fletcher in Baldwinville, on April 14, for non-payment of the taxes of 1920. The tract of land consists of about 75 acres. The tax due is $509.

Dismantling Work Begun.—The work of dismantling the line of the Norwich & Westerly Traction Company, running from Westerly, R. I. to New London, a distance of about 22 miles, has been commenced by the Eastern Connecticut Power Company, which recently took over the private right-of-way from Robert W. Perkins, receiver. Traffic over the line has been discontinued except for a distance of about 3 miles at each end.

Stock Offered.—A syndicate composed of Dominick & Dominick, W. A. Harriman & Company, Inc., and Edward B. Smith & Company is offering, at a price to yield 7¾ per cent, $2,000,000 of 7 per cent cumulative preferred stock of the American Water Works & Electric Company, Inc. The par value is $100. The stock is redeemable as a whole or in part, after three years from date of issuance, at $110 per share and accrued dividends.

Change in Capital Structure Assured.—The change in the capital structure of the Columbia Gas & Electric Company, New York, N. Y., as recommended recently by the company's directors, is now assured, officers state, more than 75 per cent of the total outstanding stock having been deposited. Stockholders will meet on April 10, and a formal vote will then be taken to effect the change from 500,000 shares of $100 par value stock to 1,500,000 shares of no par value.

Bond Issue Approved.—Issuance of $36,000 first mortgage 6 per cent bonds by the Eureka Power Company to be delivered to the New Jersey & Pennsylvania Traction Company, Trenton, N. J., in cancellation of $32,885 indebtedness has been approved by the Public Utility Commission. The board also approved issuance of $1,800, par value, of capital stock for cash to the Pennsylvania-New Jersey Railway in cancellation of an equal amount of indebtedness. After the issuance of these securities, said the board, an investment of $44.52 in fixed capital as of Dec. 31, 1922, will remain uncapitalized.

Traffic and Transportation

Seattle Cannot Invade General Fund

Spring Election on This Point Abandoned—Committee Formed to Confer on Deficits—Many Suggestions Made

With an opinion from the City Corporation Counsel, T. J. L. Kennedy, that the city of Seattle cannot invade the general fund, even if the electorate at the general election on May 8 extended such permission, the City Council has abandoned its plan of presenting this measure to the voters at the spring election. Corporation Counsel Kennedy states that such action would not be legal in view of the injunction now in force against the city, which was issued in the fourteen taxpayers' suit against use of the general fund a year ago. Once having decided to operate as a public utility proposition, the street railway may not become a taxpayers' proposition, and in any event the plant cannot be changed into one which would draw upon the general fund for support, is the substance of the Supreme Court's ruling which Mr. Kennedy incorporates in his advice.

$4,000 A DAY BEHIND

With this contingency removed, the City Council is divided upon plans to meet the daily deficit of $4,000 which is being piled up by the Seattle (Wash.) Municipal Railway lines. Patronage has increased about 2 or 3 per cent, whereas it is agreed that 40 per cent or more is necessary to meet expenses. Various expedients are offered by Council members, including a suggestion that the $1 pass system be tried out; that street car fares be again raised; Mayor E. J. Brown says he is not worrying about the 5-cent fare yet,—that at least four months' trial should be given the lower rate. In the meantime, a special committee headed by Councilman C. B. Fitzgerald has been appointed to confer with Mayor Brown, and try to devise some means of meeting the daily deficit.

In the meantime, local newspapers are lambasting the city councilmen, declaring that the street railway problem has become "too hot for political fingers to handle," and that members of the city administration "have not the strength of character to take up the matter properly." The Council is urged to hand the street railway system back to Stone & Webster, persuading them to give up the $15,000,000 bonds. The Seattle *Times*, a leader in the street car fight problem, states editorially:

> We must give the railroad back to Stone & Webster and make them take it, and we must give it to them without such franchise restrictions and requirements as existed before, so that they can run it at a profit. The harsh terms imposed upon the franchise holders were what forced them to make the impossible contract with the city. Stone & Webster can make a profit out of the railroad if relieved of the heavy franchise requirements existing before the sale was made. We may have to enlarge the rights and privileges of the Stone & Webster Corporation to get them to take their railroad back, yet all that comes under the head of price.

Pass Declared a Success

After seventy weeks in operation the pass system has been declared an unqualified success on the railway lines of the New Brunswick Power Company, St. John, N. B. When the pass was introduced there was some misgiving as to the permanency of the system. It was felt that the introduction was but a trial. For five weeks the purchase of passes at $1 a week was practically a negligible quantity. The system was about to be discarded when the sales started to increase. Every week since then the sales have increased until now more than 60 per cent of the passengers are utilizing passes.

"Pass One" Gives News

Since the installation of the weekly pass system the San Diego (Calif.) Electric Railway has been publishing a pamphlet entitled "Pass One." The



booklet, which appears every week, contains a calendar of events. The cartoon reproduced herewith appeared in the first issue of "Pass One."

Interurban Rates Reduced

A reduction in fares amounting to 33⅓ per cent effective on April 1 has been made to persons riding daily between Beloit and Janesville by the Rockford & Interurban Railway. To gain the advantage of this reduction a commuter must buy a fifty-ride ticket book placed on sale on the first of the month and good only for one month.

The cost of this fifty-ride book is $14, or a fraction more than 27 cents for the one-way fare figured on a straight fare and a daily basis. Previously a fifty-ride book between Beloit and Janesville has cost $21, or 42 cents for the one-way fare.

In addition to the issuance of fifty-ride books between Beloit and Janesville, the company announces a reduction of $2.50 in the purchase price of the 500-mile script book. Previously these mileage books have cost $15, but under the new tariff they sell for $12.50. Mileage books are valid until used up.

Car-Bus Proposal Rejected

Chronic "No" Vote Again Upsets the Constructive Effort to Restore Service in Saginaw

For the second time in a period of five months electors of Saginaw, Mich., on April 2 rejected a street car-bus franchise proposal. The vote at Monday's election was 10,298 in favor and 7,101 against. This is 141 votes less than the 60 per cent required for approval of franchises. However, the majority was 3,197 and is a few more than the majority that disapproved of the Wade-Henning omnibus ordinance that went down to defeat at the primaries on March 7.

The question that confronts the electors of Saginaw now is: "What are they going to do?" For almost every project that is submitted there is the so-called chronic "no" vote. How to break down the "bars" of that vote, which is generally about 41 per cent of the vote cast, is the problem. Supporters of the railway pretend to see the dawn of a new day in the election of a Mayor and two Councilmen who supplant incumbents opposed to street cars and lined up almost regularly with the minority, called by many the "obstructionists."

The new chief executive of the city is Albert W. Tausend, elected over George Phoenix. Mayor-elect Tausend supported the franchise, and although his opponent made no open fight against it, he was not in accord with the measure. Mr. Phoenix is a member of the Council and has two years to serve in that body.

The newly elected Councilmen are George S. Crabbe and William J. Wolf. The latter openly fought for the railway franchise and led the field of four candidates. Mr. Crabbe made no official announcement on the matter and ran second. With a majority of the members of the City Council in favor of street car service it is believed that action will be taken looking to the resubmission of the franchise, probably revised to meet certain objections and backed by the Council elected on that platform, and that the measure may possibly be approved.

It is expected in some quarters, however, that the minority opposition will spring another omnibus franchise, despite the fact that the last one submitted lacked nearly 2,800 votes of the necessary 60 per cent required for adoption. In the meantime, Saginaw will "ride the jitneys."

The proposal which went before the voters on April 2 was a resubmission in an amended form of the Saginaw-Bay City Railway's offer defeated last November.

Want to Try Bus.—At a recent meeting of members of the City Council of Bellefontaine, Ohio, and officials of the Indiana, Columbus & Eastern Traction Company it was proposed by the traction company that the electric car be taken off in Bellefontaine and a motor bus be tried out for the next thirty days.

New Jersey Fare Reduction Bill Fails of Passage

The bill aiming to reduce fares on the electric railways in New Jersey from 8 to 5 cents failed to pass the Legislature. In fact, the measure never got any further than the committee room. The bill was introduced by Minority Leader George of Hudson County. It was sponsored by Governor Silzer. The latter inserted a plank in his pre-election platform declaring that if elected he would try to have the fare reduced. The bill went to a committee room, where it was reported adversely. The statement accompanying the bill said that the object of the bill was to declare a definite legislative policy with regard to the valuation of railway properties operating under certain conditions specified in the bill. Further, that the bill provided for varying schedules of rates with increases allowed in the rates of return on the value of railway properties as rates of fare were reduced. That in the event of any company refusing to accept the legislative policy as declared in the bill its franchise, by the operation of the act, would cease.

Pass System for Rainier Valley Line—Municipal Operation Suggested

The application of the Seattle & Rainier Valley Railway, Seattle, Wash., for permission to install the weekly pass system has been granted by the Department of Public Works at Olympia. It was intended to put the pass on sale on April 2 for a trial period of four months. Under the ruling, weekly passes can be sold to patrons of the road, good only within the city limits, for $1.25 each.

In the meantime, the Rainier Valley Five-Cent Fare Club, composed of citizens of that district, is declaring that instead of reducing the present fare of 8½ cents, the pass increases the fare. The members point out that for the passengers who use the cars twice daily, six days a week, to and from employment, the fare would be only $1, instead of the $1.25 pass charge. A hearing upon the complaint against the present fare will be held in Seattle shortly by Department of the Public Works officials.

Five-Cent Fare Cuts Revenue $5,000 a Day in Seattle

According to figures prepared by Superintendent of Public Utilities, George F. Russell the Seattle (Wash.) Municipal Street Railway loss since the 5-cent fare became effective on March 1 has been virtually $5,000 a day instead of $4,000, as mentioned in the article on page 622 of this issue. The figure of approximately $5,000 a day included the depreciation reserve. The increase in the number of car riders compared with March, 1922, has been 7.31 per cent.

The special committee appointed by the Council is working with Mayor E. J. Brown and other Council members to devise means of increasing patronage, cutting down expenditures and providing for the semi-annual interest payment of approximately $370,150.

The Lower Cost of Government League urges that politics be put aside in the operation of the municipal railway. The league advises the employment of an experienced transportation manager at a salary of $25,000 a year, giving him a free hand to conduct the affairs of the line.

New Jersey Company to Seek Bus Rights

John L. O'Toole, assistant to President Thomas N. McCarter of the Public Service Railway, New Jersey, has written to the town commission of Belleville about the transportation situation there. He states that the New Jersey Transportation Company, now operating buses from Manville to Somerville, is in a position through an arrangement which it has made with the Public Service Railway to submit a proposition to the commission to supply bus service to the Union Avenue section in Belleville. A hearing on the matter is to be held on April 10. Application for similar rights to accommodate Union Avenue residents has been made by private bus owners so that the proposal made by the Public Service through its subsidiary, the New Jersey Transportation Company, puts the railway in active competition with the private owners for operating rights.

Buses to Operate in Greece by May 15.—James F. Hamilton, president and general manager of the New York State Railways, states that three buses will be put in operation in Greece, N. Y., by May 15. The franchise permitting the company to operate buses was granted by the town board on March 2.

Through Freight Service Started.—Through freight service between Dayton and Cleveland (Ohio) was started April 2 over the Indiana, Columbus & Eastern Traction Company's line and connecting traction lines. The through freight is being routed via Springfield, Columbus, Delaware, Marion, Bucyrus, and Mansfield.

Substitution of Buses Allowed.—The Washington Railway & Electric Company, Washington, D. C., has received permission from the Public Utilities Commission of the District of Columbia to substitute buses for electric cars over the Tenleytown-Potomac Park line from Seventeenth and H Streets to Potomac Park. The railway will issue free transfers for use between buses and trolleys.

Bus Lines Over Utica Parkway.—Papers of incorporation are to be filed shortly by the Utica Railway Co-ordinated Bus Line, Inc., the new company formed by the New York State Railways for the purpose of operating a bus line over the Parkway in Utica. The buses are not being put into service with the idea of their becoming a paying proposition, but as a convenience for the people who live along the Blurrstone Road and along the Parkway and in cases many blocks from any car line.

Bus Line Authorized.—Through a recent order of the Public Utilities Commission the Capital Traction Company, Washington, D. C. has been authorized to operate a motor bus line acting as a feeder for its Fourteenth Street railway line. There will be a 2-cent transfer privilege between the two lines. Buses will run from the terminus of its Fourteenth Street line, west on Kennedy Street to Sixteenth Street, north on Sixteenth Street to Montague Street, east on Montague Street to Fourteenth Street and south on Fourteenth to the terminal at Kennedy Street.

Pass Said to Be Working Well.—The Springfield (Mo.) Traction Company's plan of selling a pass for $1 has met with favor from both bus and electric railway patrons. The pass system was not put into effect in Springfield to help eliminate a competitor as the traction company owns all the railway lines and the buses operating in the city. The very large increase in the use of private automobiles during the past few years has, however, tended to keep the railway earnings down. The City Council has adopted an ordinance restricting the parking of automobiles to a period of two hours.

Agreement Reached on Fares.—At a conference before the committee on street railways of the Massachusetts House on March 27 an agreement was reached by which a 10-cent fare between Hyde Park and Boston will probably result. Representatives of the Boston Elevated Railway, the Eastern Massachusetts Street Railway and the city of Boston agreed that the lines of the Eastern Massachusetts in Hyde Park should be taken over by the city, which shall lease the lines to the Elevated at an annual rental of 4½ per cent. The price to be paid by the city for the Hyde Park lines, under the agreement would be determined by a jury to be drawn from among the voters of Suffolk, Norfolk or Middlesex counties.

Seeks Rerouting to Eliminate Transfer Charge.—Residents of the Lake Burien district have petitioned the City Council of Seattle, Wash., to reroute the Lake Burien cars so as to make the loop uptown instead of around Washington Street. The change is asked to do away with the present 1½-cent transfer charge under the 5-cent fare required on those car services which do not make the loop through the downtown business centers. The request made to the railway department recently was denied, Superintendent Henderson declaring that such a change in operation would mean an added cost of $25,000 to $30,000 yearly. The utilities committee of the Council is again taking the matter up with the railway officials.

Legal Notes

FEDERAL COURTS—*Statute Providing for Public Operation of Boston Elevated Railway Held Not Unconstitutional.*

The Massachusetts statute, providing for the operation of the Boston Elevated Railway by trustees, for the payment of any deficit from the treasury of the commonwealth, and for the assessment of the amount paid as taxes, and delegating to the trustees the power to determine the needed expenditures to comply with the obligations of a lease or the requirements of adequate public service, held not unconstitutional, as violative of Const. U. S. Amend. 14. [City of Boston vs. Jackson, 43 Supreme Court Rep., 129.]

FEDERAL COURTS—*A Receiver May Take Reasonable Time and Consider Interest of Public Before Rejecting Lease of Railway.*

This case arose because the receiver of the New York Railways, who was appointed March 20, 1919, did not turn back the property of the Eighth Avenue Railroad until Aug. 1 and the Ninth Avenue Railroad until Oct. 1 of that year. It was held that this was not an unreasonable time, especially in view of the fact that the lessor companies were without cars and other facilities to operate the lines if they should have been turned back earlier, and that the lessor was entitled only to the net earnings of the properties and not to the rent specified in the lease. [American Brake Shoe & Foundry Company vs. New York Railways, 282 Fed. Rep., 523.]

FLORIDA—*The Word "Running" Does Not Apply to a Stationary Car.*

A Florida statute declares that a railroad company shall be liable to damage done to persons or property "by the running of locomotives or cars," unless the company shows that its agents have exercised reasonable care and diligence. The word "running" in this section conveys the idea of action and the presumption does not hold where a passenger was injured in leaving the car while it was stationary. [Tampa Electric Co. vs. Soule, 94 Southern Rep., 692.]

IOWA—*Carrier Liable When Interloper Released Brake.*

While a motorman was absent from his car to get a new package of transfers, an interloper released the brakes and the car began to coast down an incline toward a railroad crossing where a train was passing. The passengers hurriedly left the car and the company was held responsible to a woman passenger who sprained her ankle while alighting from the moving car. [Kliebenstein vs. Iowa Railway & Light Co., 188 Northwest Rep., 129.]

IOWA—*Company Not Held Liable for Collision With Automobile on Reservation.*

On a street where the tracks are in an unpaved reservation in the center of the street an automobile skidded on the wet pavement on the side and part of it projected over the railway tracks. The evening was misty and a trolley car soon after ran into the stalled automobile. The railway company was held not liable, as the last clear chance doctrine applies only if the defendant has knowledge of the negligence on the part of the plaintiff. [Baker vs. Des Moines City Railway, 188 Northwest. Rep., 829.]

MISSOURI — *Automobile Driver Not Bound to Drive So as to Be Able to Avoid Street Cars Violating a Speed Ordinance.*

Where an ordinance limited street cars to 10 m.p.h., an automobile driver was not bound to drive at such rate as to enable him to stop or slow down in time to avoid cars running at 30 or 35 m.p.h., but only cars running at the lawful rate. [Mason vs. United Railways of St. Louis, 246 Southwestern Rep., 319.]

MISSOURI—*Company Not Responsible When Automobile Without Chains Skidded.*

There was evidence tending to show that the street car moved forward quickly at a corner without preliminary warning and without the motorman looking for coming automobiles, and it may be assumed for the purposes of the case that the motorman was negligent in so doing. The pavement was wet and slippery and the plaintiff's automobile had no chains, and the plaintiff testified that if her automobile had not skidded, it would have stopped. The motorman had the right to assume that the driver of the car would use ordinary care, which included the use of chains in these circumstances, and there can be no recovery. [DeMoss vs. Kansas City Rys., 246 Southwest. Rep., 566.]

MISSISSIPPI — *In Suit for Failure to Stop for Intending Passenger, It Was Error to Admit Testimony as to Previous Controversy with Motorman.*

In a suit for damages in which the plaintiff received $500 in the trial court for wilful failure of a motorman of a street car to stop for her when she indicated that she desired to board the car, it was error to admit testimony on the trial showing the details of a previous controversy between the same motorman and passenger, or the son of the passenger, about a different matter. [Meridian Light & Ry. Co. vs. Williams, 91 Southern Rep. 863.]

NEBRASKA—*Interurban Company's Use of Street Railway Tracks Held Unauthorized.*

The statute, providing that the city council may require a street railway company to permit an interurban company to use its tracks, so that the interurban company may enter the city and have terminal facilities therein, is not broad enough to authorize the council to grant to an interurban company the right to use other tracks of the street railway company for the purpose of extending the interurban's local street railway business within the city and of diverting to its own lines street railway business which would otherwise have gone to the local company. [Lincoln Traction Co. vs. Omaha L. & B. Ry., 187 Northwest. Rep., 790.]

NEW HAMPSHIRE—*Conductor Injured While Signaling Car for His Own Purpose Held to Be a Trespasser on the Highway.*

The plaintiff, while on duty, left his own car and attempted to stop another by signaling it because he expected that his wife was on the other car. To do this signaling he stopped in the middle of the track but was not seen by the motorman of the other car and was injured. The court held that the accident did not arise out of his employment, and so he did not have the rights of an employee. [Manning vs. Manchester Street Railway, 118 Atlantic Rep., 386.]

NEW YORK — *City's Recourse Against Operation of One-Man Street Cars.*

A city is not without recourse to prevent the operation of one-man street cars, if such operation is dangerous, even though it has no authority to prohibit it by ordinance; but it, or any of its citizens, may invoke the power of the Public Service Commission to act in the premises, and the action or refusal to act of the commission is subject to review by the courts, under the Public Service Commission Law. [City of Schenectady vs. Schenectady Ry., 194 New York Sup. 375.]

NEW YORK—*A Charter Authorizing the City to Regulate "Operation and Speed" Held Not to Authorize Ordinance Regulating Weight of Interurban Cars.*

Rochester City Charter, Sec. 85, 86, authorizing the city to regulate the "operation and speed" of railroads in the streets of the city, did not empower the city to pass an ordinance regulating the weight and character of the wheels of interurban and suburban cars using the right-of-way of a street railway under a traffic agreement with the railway. [New York State Railways, et al., vs. City of Rochester, 195 New York Sup., 783.]

NEW YORK — *Alighting Passenger Struck by Car on Adjoining Track.*

It is not negligence as a matter of law for a passenger alighting from a street car to pass around the rear of

the standing car and attempt to cross the adjoining track, where she looked and listened as diligently as possible, but was struck by a car approaching at a rapid rate of speed without signal. [Wall vs. International Ry., 135 Northeast. Rep. 512.]

NEW YORK—*Adoption of Rules to Cover Certain Contingencies Is Warrant of Inference to Apprehend Danger.*

An inference of a carrier's negligence may be drawn from disobedience to rules drafted by itself. Thus, the adoption by an elevated railway company of rules carefully guarding against danger from the throwing of bundles of newspapers from moving trains at station platforms warranted the inference that there was reason to apprehend danger from the unregulated carrying of bundles of papers. [King vs. Interborough Rapid Transit Co., 233 New York Sup. 330.]

NEW JERSEY—*Responsibility to Passenger Hurt While Assisting in Ejectment Case.*

A passenger complained to a conductor about a disorderly negro passenger and was asked by the conductor to assist in ejecting him. During the fight the conductor deserted when the negro drew a knife and the passenger assisting in the ejectment was injured. The company was held responsible. [Frazier vs. Public Service Ry., 116 Atlantic Rep. 769.]

NEW JERSEY—*Child Injured in Car Yard Where Play Was Permitted.*

A car storage yard was inclosed, but there were paths through it used by the public and the children had a ball ground there and played with the trucks and wheels. While doing so one was injured when an unbraked truck rolled down an incline. The company was held to be responsible. [Public Service Ry. vs. Wursthorn, 278 Federal Rep. 408.]

NEW JERSEY—*The Obstruction of the Highway for a Reasonable Time Without Warning Is Permissible.*

A railway company is entitled to obstruct a highway grade crossing by its cars or trains for a reasonable time, and while in the exercise of that right is not required to give warning to travelers on the highway of the obstruction to travel. [Nadasky vs. Public Service Railroad, 117 Atlantic Rep., 478.]

NEW JERSEY — *Automobile Passengers Have a Duty to Look Out for Their Own Safety.*

An automobile with three passengers besides the driver drove into an excavation made by a railway company for repairing its tracks and insufficiently guarded. Suit was brought by all four in the automobile and the jury found against the driver but in favor of the others, and it is their verdicts which are under consideration in this case. The trial judge properly said that any negligence of the driver could not be imputed to his passengers, but he also said: "If the man who drove the car was not contributorily negligent and the defendant was negligent . . . , all the plaintiffs are entitled to a verdict, the driver included." The Supreme Court held that this instruction was incorrect because it implied that the passengers owed no duty to care for their own safety in any situation wherein the driver was not himself negligent, and as the verdict was against the driver, it was impossible to say whether the jury based its findings for the other plaintiffs on the theory that they were chargeable with no duty or that no delinquency in their duty had been shown. [Schroeder et al. vs. Public Service Ry., 118 Atlantic Rep., 337.]

OHIO—*Franchise Obligation as to Fare in Certain Territory Not Affected by Annexation of Such Territory by City.*

The obligation of a street railway to carry passengers for a certain fare from a village to a certain point outside the village under its franchise with the village was not affected by a city's annexation of such territory, since the city took the territory subject to all valid contractual rights then in existence, which contractual rights were protected by Const. art. 2, sec. 28, and Const. U. S. art. 1, sec. 10, relating to impairment of the obligation of contracts. [Village of Wyoming vs. Ohio Traction Company, 135 Northeastern Rep., 675.]

OKLAHOMA — *Instruction as to Duty to Alighting Street Car Passengers Held to State Law Correctly.*

In an action for injuries to a street railway passenger, while endeavoring to alight from a car, where the court instructed the jury that the defendant street railway company owed to its passengers the duty to exercise the utmost care and diligence to afford them a reasonable opportunity to alight in safety from its cars, to stop such cars a reasonable length of time for the purpose, and to ascertain that its passengers who were attempting to alight had alighted from said cars before the same were again started, it was held that the instruction correctly stated the law defining the duty of the defendant company to its passengers. [Muskogee Electric Traction Company vs. Elsing, 208 Pacific Rep., 264.]

WEST VIRGINIA—*Substation Employee in Interstate Commerce.*

Where a substation operator receives a pass which designated him as a railway employee and his wages were paid by the railway company, he was its employee for the purpose of the federal Employers' Liability Act, although the substation belonged to a power company. And as the employee was injured while installing a new rotary and transformer intended to supply energy for the operation of cars in interstate service, he was employed in interstate commerce, within the meaning of the federal liability act. [Hally vs. Ohio Valley Electric Railway, 114 Southeastern Rep., 572.]

UTAH. — *Workmen's Compensation Act and Part Time Employee.*

A power station employee who spent part of his time operating railway machinery on one side of the building and part on lighting machinery on the other side of the building and was injured while operating the lighting machinery was not an employee of the railway company so far as the Workmen's Compensation Act is concerned, but the full amount of his award based upon the total amount of his earnings from both companies should be made against the lighting company alone. [Bamberger Electric R. Co. vs. Industrial Commission of Utah, 203 Pacific Rep. 345.]

UTAH—*Responsibility for Precautions Between Motorman and Company.*

Where a motorman was killed by the overturning of a street car at a curve visible at least 500 feet therefrom, and there was a slow-down sign approximately that distance from the curve, it was not error for the trial court to take from the jury the question of negligence in failing to place a slow-down within a reasonable distance from the curve. As between a motorman and a street railway company, also, a defective condition of the brakes is insufficient to establish the company's liability in the absence of any evidence that the company knew, or might by proper inspection have known, of the defect. [Burbridge vs. Utah Light & Traction C., 211 Pacific Rep., 691.]

VIRGINIA—*Person Transferring to Another Car Is Not a Passenger After Reaching Place of Safety.*

A person who has alighted from a street car for the purpose of transferring to another car and has reached a place of safety, is not a passenger, but is entitled only to the same degree of care from the company as any other pedestrian upon the highway. [Virginia Ry. & Power Co. vs. Dressler, 111 Southeast. Rep. 243.]

WISCONSIN—*Building a Double-Track Street Railway on Street Constituting Dividing Line Between City and Town Held Not an Additional Burden.*

Where one-half of a street is located within the limits of a city, and the other one-half is within the limits of a town, and the street is used almost exclusively for city travel, and a single-track railway is operated on the portion within the city, such street is not a rural highway, and the construction of a double-track street railway does not impose an additional burden or an illegal taking of property. [Packard Motor Car Co. vs. Milwaukee Electric Ry. & Light Co., 190 Northwest Rep., 914.]

Personal Items

Team Mates

Claus Spreckels and "Ed" Burns Are Doing Surprising Things Out at San Diego

Zone fares, weekly passes, monthly commutation, safety cars, motor-coaches—all these and more galumphing about in a city of 100,000 must draw attention to the men behind them. Well, these men are: Claus Spreckels, general manager, and his side-kick, Edward Johnson Burns, assistant general manager.

Claus Spreckels' novitiate was spent as secretary and treasurer of the San Diego Electric Railway. In February, 1922, however, he became general manager. His outspoken indorsement of motor-coach operation at the time *Bus Transportation* was projected showed that the younger Spreckels had inherited the courage and foresight that have made San Diego and Spreckels synonymous. But Claus Spreckels is more than in independent thinker; he also takes his duties as a purveyor of mass transportation so seriously that he has the funny idea that he ought to buy no vehicle that he would not enjoy riding in himself. He has already proved this through his motor coaches, and it will be proved again in the next lot of cars that San Diego buys. Moreover, in accepting the weekly pass installed on New Year's Day, 1923, his primary idea was not to get more money from the public but to make it easier for the public to do business with his concern.

HUMAN RELATIONS A FACTOR

The same human spirit is being shown by Mr. Spreckels in his relations with the men. In addition to the sales commission which the platform men have hitherto enjoyed in selling tokens (and now passes as well), he has revised the accident bonus system so that the men will be rewarded in proportion to their individual efficiency. On top of this, he has added a series of individual monthly awards for exceptional courtesy, neatness and other desirable qualities.

Another 1923 innovation is the welfare department with free medical service to the men and their families.

At a get-together party on Dec. 29, 1922, his address to the men and women of the staff was marked by such sincerity that the ensuing ovation would have convinced any auditor that the average man knows the difference between buncombe and candor. Not the least stirring feature of the evening was his presentation of splendid gold watches and fobs to a pair of twenty-year termers.

Right alongside Claus, is "Ed" Burns. "Ed" holds the degree of *summa cum laude* from Hard Knox University. At the age of fourteen he started as call



Claus Spreckels

boy on a steam railroad, went through the shops and other mechanical departments and then found himself trolleying with the Utah Light & Railroad Company. Then he hied himself to the "Key Route" at Oakland, Calif., and next entered the bureau of finance, California Railroad Commission, following which he became manager of the San Diego & Southeastern Railway, a steam line which was later absorbed by the San Diego & Arizona Railway. "Ed" remained with the Spreckels interests, however. During 1918 to 1920, he was engaged chiefly in electric railway rate cases. On Jan. 1, 1920, he blossomed out with a 5-cent base zone fare that added 33 per cent to the company's revenues and gained passengers, too! A little thing like running side-gate cars with multiple fares and one man had no terrors for Burns and his loyal crew. When Santa Claus Spreckels slipped the weekly pass down the San Diego chimney Christmas, 1922, it was Brother Burns who led the bally-hoo with such success that men and patrons alike rose to the pass like a trout to a fly in April.



E. J. Burns

Government Drafts Mr. Feiker Again

At the request of Secretary Hoover of the United States Department of Commerce, F. M. Feiker, assistant to the president of the McGraw-Hill Company, Inc., publisher of the ELECTRIC RAILWAY JOURNAL, has again been granted leave of absence to undertake the organization and general direction of the world surveys of raw material supplies, rubber, sisal hemp, and nitrates, for which Congress recently made an emergency appropriation of $500,000.

Mr. Feiker served as assistant to the Secretary of Commerce during the first year of Mr. Hoover's administration, acting as general assistant in organizing the personnel and industrial trade contact committees in relation to the Bureau of Census, the Bureau of Standards and the Bureau of Foreign and Domestic Commerce. Out of his nine months work came the monthly statistical survey of the Bureau of Census, the Division of Simplified Practice of the Bureau of Standards, Commerce Reports in new form and fifteen so-called commodity divisions of the Bureau of Foreign and Domestic Commerce.

E. J. McIlraith Made Staff Engineer

E. J. McIlraith has been appointed staff engineer under G. A. Richardson, vice-president of the Chicago Surface Lines. The appointment became effective on April 1. Mr. McIlraith was formerly with the Philadelphia Rapid Transit Company. He became connected with the company operating the railway lines in the city of Philadelphia in 1919, when he entered the elevated-subway division. In 1920 he was made operating manager of the division and in less than a year became superintendent of way. In April, 1922, he was promoted to the head of the department of rolling stock and buildings. Before joining the forces of the Philadelphia property Mr. McIlraith was associated with Stone & Webster in Seattle, assuming the position of superintendent of way in 1913. He is a graduate of the University of North Dakota and was instructor at Cornell University for three years.

Mr. McKinley and Mr. Studebaker Head New Company

William B. McKinley, who has been president of the Illinois Traction Company, will be chairman of the board of the Illinois Power & Light Corporation, which is acquiring an extensive group of long-established utility properties and which will control Illinois Traction, Inc., through ownership of the entire capital stock of that company. The president of the Illinois Power & Light Corporation will be Clement Studebaker, Jr., who with his associates, through the medium of the North American Light & Power Company, is acquiring a controlling interest in the company. Mr.

Studebaker is chairman of the board of the North American Light & Power Company. Among the directors of the Illinois Power & Light Corporation in addition to Mr. McKinley and Mr. Studebaker will be William A. Baehr, H. E. Chubbuck, George Mattis and G. W. Niedringhaus.

E. J. Dickson Resigns

Vice-President in Charge of Operation at Buffalo Retires After Ten Years of Service

E. J. Dickson, who for the last ten years has been vice-president in charge of operation of the International Railway, Buffalo, N. Y., tendered his resignation at the annual meeting of the stockholders of the company during the week ended March 31, the resignation to become effective on May 1. Mr. Dickson has been with the Buffalo property since 1913, and when the present Mitten management took control in 1920 he was one of the few officials connected with the former administration who remained with the property.

As vice-president in charge of operation Mr. Dickson has served throughout the most difficult period in the company's history, beginning with the strike of trainmen in July, 1922. Although he has desired for a long time to be relieved of his duties, he felt it his duty to remain until this emergency had been successfully passed. That his services have been greatly appreciated by the company and that his resignation will be keenly felt is indicated by the following statement issued by the board of directors:

E. J. Dickson, vice-president of the company for some years, today resigned, and retired from the International Railway. The announcement of Mr. Dickson's resignation, made by the company officials, was as follows:

"E. J. Dickson, who has for some time past been desirous of being relieved of his duties as vice-president with the International Railway, had, however, consented to continue until the annual organization meeting held today. His resignation was accepted with regret by the management, which takes this occasion to express its great appreciation of his valuable services."

Mr. Dickson started in the transportation industry as office boy with the Chicago, Burlington & Quincy Railway at Galesburg, Ill., at the age of thirteen in 1887. He was advanced through various clerical positions to that of assistant trainmaster at Galesburg. He next was chief clerk in the office of the superintendent of motive power, with the Northern Pacific Railway at St. Paul, Minn., for three years, and following this occupied a similar position with the Lehigh Valley Railway at South Bethlehem, Pa., for three years. He next became secretary and purchasing agent of the New England Investment & Security Company, a holding company for twenty-three trolley lines in the New England District. This was in 1907. After this he became general manager of a group of four electric railways at Attleboro, Mass. Following this he was made general manager of the Springfield (Mass.) Street Railway. In 1913 he became vice-president in charge of operation of the International Railway, which position he has held up to the present time.



E. J. Dickson

Mr. Dickson's resignation from the International Railway has caused distinct regret among the Buffalo people, as reflected by comment in the public press. He has been held in very high regard and enjoyed the confidence of the public and the good will of all his associates. His career has been marked by steady advancement from the lowest rank in the ladder to very nearly the highest, and he has the good wishes of a host of friends throughout the industry.

Mr. Geisse Heads Wisconsin Association

Harold L. Geisse was elected president of the Wisconsin Utilities Association at the recent convention of that association in Milwaukee. Mr. Geisse is the secretary and general manager of the Wisconsin Valley Electric Company at Wausau, Wis. He was graduated from the University of Wisconsin in 1907. He served as statistician with the Railroad Commission of Wisconsin for one year and then joined the operating staff of the San Antonio Gas, Electric & Traction Company in Texas. Mr. Geisse returned to Wisconsin in 1913 and re-entered the employ of the Railroad Commission as statistician. Subsequently he was promoted to assistant secretary and finally secretary. In the spring of 1919 he became associated with the Northwest Utilities Company, an Insull property, and later operated the Janesville Electric Company. Mr. Geisse remained with this organization until August, 1921, when he took charge of the Wisconsin Valley Electric Company.



H. L. Geisse

Changes Made in Ironwood Property

The following appointments and changes have been made in the personnel of the Ironwood & Bessemer Railway & Light Company, Ironwood, Mich.: W. T. Leander replaces W. H. P. Weston as secretary and treasurer, W. J. Hodgkins, formerly purchasing agent, is now general manager; the position of purchasing agent is being filled by L. G. Gothe; J. B. O'Neil, formerly line superintendent, has become district manager, supplanting E. L. Hinchliff; E. O. Sinrud replaces W. A. Campbell as assistant district manager; R. S. Wilhelm, formerly engineer of power station, has become chief engineer, and R. L. Boisen is electrical engineer.

Mr. Johnson Made General Superintendent of Toledo Property

J. Franklin Johnson, who has been receiver in charge of operation of the Toledo & Western Railroad for three years, has been made general superintendent of the Community Traction Company, Toledo, by order of President Frank R. Coates and relieved of his duties as receiver for the interurban line by the Federal court at Toledo.

Albert A Swartz, who has been vice-president and superintendent of transportation of the Community Traction Company, has been named receiver for the Toledo & Western and will succeed Mr. Johnson in the operation of that property. Mr. Swartz was for a number of years with the Toledo & Western and is familiar with its many problems. It is expected that he will wind up the receivership possibly within the present year.

Joseph M. Enright has been placed in his old line of work as superintendent of transportation. He occupied that place for several years with the Toledo Railways & Light Company before the Community Traction Company was organized.

It is expected that Mr. Johnson will take complete charge of the big maintenance program and repair and extension work that the Community Traction Company has planned for 1923.

The personnel changes became effective on April 1.

Thomas Penney, who for many years has been a vice-president of the International Railway, Buffalo, N. Y., was not re-elected to that position at the annual meeting of stockholders. Mr. Penney retains his place on the board of directors and continues to have the

title of general counsel. He formerly was president of the company and always has been active in its affairs.

C. J. Joyce, general counsel for the Mitten Management, Inc., and a member of the legal staff of the Philadelphia (Pa.) Rapid Transit Company, has been elected vice-chairman and counselor of the board of directors of the International Railway, Buffalo. This is a new position. Mr. Joyce also becomes a member of the executive committee of the International Railway.

Charles W. Murray, for the past two years superintendent of the Janesville (Wis.) Traction Company, has resigned. He expects to depart soon for Wyoming, where he has land holdings. His successor has not yet been named. Mr. Murray is a nephew of W. C. Sparks, general manager of the Rockford & Interurban Railway, of which the Janesville Traction Company is a subsidiary.

Matt J. Kennedy, formerly with the Montreal Street Railway, now the Montreal Tramways, has gone into business for himself in Montreal with a fleet of fifty taxis. Mr. Kennedy was connected with the Brooklyn Rapid Transit Company for a period of about five years some ten years ago during the superintendency of Dow S. Smith. For part of this time he served as superintendent of the Ninth and Vonderbilt Avenue divisions.

W. J. Curle, general superintendent of the Chatham, Wallaceburg & Lake Erie Railway, Chatham, Ont., has resigned. Mr. Curle has been a prominent figure in the railway field in Canada for more than thirty-five years. He entered railway service with the Grand Trunk Railway at Brockville, Ont. Subsequently, he held positions with the Canadian Pacific Railroad, the Brockville, Westport & Northwestern Railway and the Canadian Northern Railway. In 1916 he was appointed general manager of the Chatham, Wallaceburg & Lake Erie Railway to succeed the late William Norris.

J. W. Gerke, for many years associated with several electric railways and for the past three years staff engineer with the Texas Company, has joined the Transit Equipment Company, New York, as vice-president and general manager. He will take active charge of its plant at Saybrook, Conn., with a view of developing this branch of the company's business. Mr. Gerke started his railway career in the shops of the Capital Traction Company in 1897, leaving in 1905 to become superintendent of the Washington, Arlington & Falls Church Railway. In 1909 he became connected with the J. G. White Engineering Corporation and was assigned to the Tri-City Railway at Davenport, Iowa, as superintendent of equipment and buildings, but in 1911 he went to Wilmington, Del., as master mechanic of the Wilmington & Philadelphia Traction Company and the Southern Pennsylvania Traction Company. In 1915 he became superintendent of maintenance in charge of all departments excepting transportation of the New York & Queens County Railway and Long Island Electric Railway, remaining for six years.

New Superintendent of Transportation in Buffalo

As was reported in the ELECTRIC RAILWAY JOURNAL, issue of March 24, Thomas D. Kiniry has been appointed general superintendent of transportation of the local and interurban lines of the International Railway, Buffalo, N. Y., to succeed William M. Casey, who has accepted a similar position with the Georgia Railway & Power Company, Atlanta, Ga.

Mr. Kiniry was born in Glen Mills, Pa., and was educated in the public schools of that town. In his early years he served as an apprentice printer and later played semi-professional baseball. In May, 1900, he joined the Philadelphia Rapid Transit Company as a motorman and continued in that position four years, when he was promoted to the position of supervisor.



T. D. Kiniry

In May, 1906, Mr. Kiniry was appointed one of a staff of assistant division superintendents. On Jan. 1, 1913, he was made division superintendent in charge of the Amber depot and in April of that year, when the Philadelphia Rapid Transit Company opened the new Luzerne depot, Mr. Kiniry was transferred to that depot as first assistant division superintendent. He remained in that position under Mitten Management until Jan. 6, 1919, when he was made division superintendent at the Callowhill depot. In July of that year Mr. Kiniry was transferred from the Callowhill depot to the Luzerne depot as division superintendent and the next month he was made district superintendent, which position he held until he was made superintendent of supervision, April 1, 1922.

Since the early part of December, 1922, Mr. Kiniry has been detailed to Buffalo by Mitten Management, Inc., in the capacity of supervisor to the instruction force, and with the resignation of Mr. Casey, Mr. Kiniry was made general superintendent of transportation of the local and interurban lines of the International Railway.

Obituary

George A. Weber

George A. Weber, inventor of the Weber rail joint, died at his winter home in Pasadena, Cal., on March 29. He was in his seventy-fifth year. Mr. Weber was founder of the Weber Rail Joint Manufacturing Company, which was incorporated in 1889. In 1905 this company, with the Continuous Rail Joint Company and the Independent Railroad Supply Company, formed a consolidation under the name of the Rail Joint Company. Mr. Weber has been a director of the Rail Joint Company since its incorporation and has always taken a keen interest in its affairs.

Charles Thomas Nicholas White Spunner, for many years treasurer of the Mobile Light & Railroad Company, Mobile, Ala., is dead.

A. S. McSwigan, president of the Kennywood Park Corporation, Pittsburgh, Pa., is dead. At the height of the street railway park movement Mr. McSwigan gave freely of his advice as an amusement man to the electric railway interests. He was at one time on the staff of the Pittsburgh Railways in charge of park matters.

George H. Guy, for the last forty years secretary of the New York Electrical Society, died on April 1. He was born in England, studied music in Leipzig, spent several years sugar planting in Jamaica, West Indies, and then came to New York. In addition to his brilliant work for the electrical society, Mr. Guy did much to promote automobilism and aviation. He was one of the leaders in the movement to secure from Andrew Carnegie the gift that created the United Engineering Societies' Building and that of the Engineers' Club in New York. He was a member of the American Institute of Electrical Engineers and the Engineers' Club.

Dr. Walter Gill Wylie, for many years intimately associated with water-power development in the South, died at his home in New York City on March 13 at the age of seventy-five years. Dr. Wylie was born in Chester, S. C., and besides being a surgeon of note was the first president of the Southern Power Company, Charlotte, N. C. He helped to organize the Anderson Water, Light & Power Company, Anderson, S. C., and later the Catawba Power Company. Early in 1900 he interested J. B. Duke, the tobacco magnate, in the water power possibilities of the Carolinas and shortly afterward the Southern Power Company, which has since grown to be the dominant power company of the South, was formed with Dr. Wylie as its head. Professional work in New York, however, caused him later to relinquish the presidency to J. B. Duke, but his interest in the industrial and power development continued unabated. Dr. Wylie was consulting surgeon of Bellevue Hospital and professor emeritus of the New York Polytechnic School for medicine for post graduates.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

Important Research Work Published

Graphic Analysis Made of Census of Manufactures of United States 1849 to 1919

The graphing of statistics reaches an unusually high level of excellence in a publication with the above title just issued by the National Industrial Conference Board, New York City. In this, the wealth of data made available, but not readily comprehensible, through the census of manufactures taken every five years by the United States Bureau of the Census, are put into such form that they can be readily analyzed and compared.

Most of the data in the volume, tabulated and graphed, relate to fifty leading industries of the country, although some statistics are given for the country as a whole. Following are the topics which are made the basis of study, to each of which nearly ten charts and tables, on the average, are devoted: Persons engaged in manufacture, distribution of personnel, value of products, major items of expenditure, average cost of service, size of establishments, character of ownership, regularity of employment, prevailing hours of labor, power in manufacturing industries, fuel used in manufacturing industries, production, labor, power and values, and a summary of the data for the fifty leading industries.

Book Well Arranged

The general arrangement in this book is to have the tabular material on the right-hand page of two facing pages and the charts on the left hand. Thus, one has before him at one time only one compilation, but this is put into forms to be readily grasped and visualized. Great ingenuity has been displayed in the preparation of the charts, which are of many different forms and colors, the form in each case being chosen best to represent the particular data to be depicted. The variety in method of graphical presentation prevents monotony in the appearance of the charts and also tends to distinguish them among themselves.

The Industrial Conference Board has done the industries of the country a great service by giving vitality to the dry statistics of the nation's manufactures. This work places at the disposal of manufacturers and others who are analytically and reflectively inclined an opportunity to survey the labor and material situation broadly. Careful study must, however, be given to the tables, charts and comments if they are to yield information of practical usefulness in any particular manufacturing field, as for example, that serving the electric railway.

Payment Ordered to Barney & Smith Creditors

Payment of 50 cents on the dollar to all creditors of the Barney & Smith Car Company, Dayton, Ohio, whose claims are not disputed is authorized in an order issued by Judge Edward T. Snediker of the Montgomery County Common Pleas Court. The court's order followed a report by Special Commissioner John Dineen that the claims of creditors total $140,039.99, which can be partly liquidated with about $100,000 cash on hand. The plant recently was offered for sale at public auction with no bidders.

Large Foreign Orders for Power Apparatus

The Compania Chileana De Electricidad, Ltd., Santiago, Chile, which has a contract to furnish power for the Chilean State Railways, has recently ordered from the Westinghouse Electric & Manufacturing Company through Carr Brothers, New York City, 45,000 kva. of power transformers, together with oil circuit breakers, bushing type current transformers and spare parts.

The apparatus included on this order is as follows: Three 7,500-kva. three-phase, 50-cycle, 100,000 to 44,000-volt, oil-immersed, forced-cooled transformers; three 7,500-kva., three-phase, 50-cycle, 100,000 to 12,000 volt, oil-immersed, forced-cool transformers; eight electrically operated, type G-11, oil circuit breakers, outdoor, 400 amp., 3-pole, single-throw, 110-kv. for floor mounting; thirteen type G-11, outdoor, 400-amp., 3-pole, 50-kv. frame-mounted oil circuit breakers, together with necessary bushing type current transformers, control relays, auxiliary switches and necessary spare parts.

The apparatus included on this order is to be used by the power company for transmitting power from its present system to the Chilean State Railways.

Brill Sale Rumors Denied

Samuel M. Curwen, president of the J. G. Brill Company, Philadelphia, has made the following statement:

To set definitely at rest rumors as to a sale of the J. G. Brill Company, I take this occasion to say no negotiations are pending for recapitalization or sale of the company or for its consolidation with any other corporation, and the board of directors is unanimously opposed to sale of the company. I am further authorized to state by owners of a controlling majority of both preferred and common stocks their holdings are not for sale.

Asks Authority for $189,000 Expenditure

Receivers of the Pittsburgh (Pa.) Railways have filed a petition in the Federal Court seeking permission to spend $189,510 for track rehabilitation. The work will be done in the boroughs of Mt. Oliver, Knoxville, Carrick and Brentwood. The petition was referred to Special Master Henry G. Wasson by Judge W. H. S. Thomson.

ELECTRIC RAILWAY MATERIAL PRICES—APRIL 3, 1923

Metals—New York

Copper, electrolytic, cents per lb	17.187
Lead, cents per lb	8.225
Nickel, cents per lb	27.50
Zinc, cents per lb	7.90
Tin, Straits, cents per lb	47.625
Aluminum, 98 to 99 per cent, cents per lb	25.75
Babbitt metal, warehouse, cents per lb.:	
Fair grade	65.00
Commercial	40.00

Bituminous Coal

Smokeless mine run, f.o.b. vessel, Hampton Roads	$6.125
Somerset mine run, Boston	3.50
Pittsburgh mine run, Pittsburgh	2.00
Franklin, Ill., screenings, Chicago	2.075
Central, Ill., screenings, Chicago	1.625
Kansas Screenings, Kansas City	2.625

Track Materials—Pittsburgh

Standard Bessemer steel rails, gross ton	$43.00
Standard open hearth rails, gross ton	43.00
Railroad spikes, drive, Pittsburgh base, cents per lb	3.15
Tie plates (flat type), cents per lb	2.575
Angle bars, cents per lb	2.75
Rail bolts and nuts, Pittsburgh base, cents, lb.	4.25
Steel bars, cents per lb	2.50
Ties, white oak, Chicago, 6i n. x 8 in. x 8½ ft.	1.50

Hardware—Pittsburgh

Wire nails, base per keg	3.00
Sheet iron, (28 gage), cents per lb	4.00
Sheet iron, galvanized, (28 gage), cents per lb	5.25
Galvanized barbed wire, cents per lb	3.70
Galvanized wire, ordinary, cents per lb	2.65

Waste—New York

Waste, wool, cents per lb	12-16
Waste, cotton, (100 lb. bale), cents per lb.:	
White	11-13.50
Colored	8-13

Paints, Putty and Glass—New York

Linseed oil, (5 bbl. lots), cents per gal	1.13
White lead, (100 lb. keg), cents per lb	13.375
Turpentine, (bbl. lots), per gal	$1.59
Car window glass, (single strength), first three brackets, A quality, discount*	84.0%
Car window glass, (single strength), first three brackets, B quality, discount*	86.0%
Car window glass, (double strength, all sizes, A quality), discount*	85 0%
Putty, 100 lb. tins, cents per lb	5.00

*These prices are f.o.b. works, boxing charges extra.

Wire—New York

Copper wire base, cents per lb	18.625
Rubber-covered wire, No. 14, per 1,000 ft	7.50
Weatherproof wire base, cents per lb	19.50

Paving Materials

Paving stone, granite, 4 x 8 x 4, f.o.b. Chicago, dressed, per sq.yd	$3.60
Common, per sq.yd	3.15
Wood block paving 3½, 16 treatment, N. Y., per sq.yd	3.19
Paving brick, 3½ x 8½ x 4, N. Y. per 1,000 in carload lots	54.00
Crushed stone, ¾-in., carload lots, N. Y., per cu.yd	1.75
Cement, Chicago consumers net prices, without bags	2.20
Gravel, ¾-in., cu.yd., N. Y	2.25
Sand, cu.yd., N. Y	1.00

Old Metals—New York

Heavy copper, cents per lb	14 00
Light copper, cents per lb	12.50
Heavy brass, cents per lb	8.50
Zinc, old scrap, cents per lb	5.25
Yellow brass, cents per lb (heavy)	7.75
Lead, heavy, cents per lb	7.25
Steel car axles, Chicago, net ton	24.75
Old car wheels, Chicago, gross ton	28.75
Rails (short), Chicago, gross ton	26.75
Rails (relaying), Chicago, gross ton	33.50
Machine turnings, Chicago, net ton	14.75

Rolling Stock

Kentucky Terminal & Traction Company, Lexington, Ky., will use the Nic Le Grand, Inc., positive safety appliance in the twenty-seven new one-man cars being built by the Cincinnati Car Company.

Augusta & Aiken Railway & Electric Company, Augusta, Ga., has announced that the sixteen one-man safety cars which it is proposing to add to its rolling stock will be built by the Perley A. Thomas Car Company, High Point, N. C. It is expected that these cars will be delivered in three and one-half months. The company will also rebuild ten cars now in service.

Worcester (Mass.) Consolidated Street Railway will add six new sweepers to its winter equipment. The company now has seven sweepers in commission. The new sweepers will be constructed by the company in its own shops during the summer months. Discarded open cars will be utilized in building them. The cost is estimated at $3,600 for each sweeper.

Indiana Service Corporation, Fort Wayne, Ind., has closed a deal for fifteen new double-truck cars to be used on the Fort Wayne city lines. The cars cost in the neighborhood of $14,000 each, making the order total more than $200,000. The cars were ordered from the St. Louis Car Company. Delivery of the new cars is to start Sept. 1. The cars will be operated by one man, as are the present cars, but there will be a front entrance and a front and rear exit, instead of only front entrance and exit. The cars will be of all steel construction and will be equipped with four G. E. 25-hp. motors and will have a seating capacity of fifty passengers.

Houston Electric Company, Houston, Tex., has purchased ten double-truck, double-end Birney safety cars from the American Car Company. They are described as follows:

Number of cars	Ten
Date order was placed	March 10, 1923
Date of delivery	August, 1923
Type of car	One-man, double-truck, double-end
Seating capacity	Forty-four
Length over all	40 ft. 1 in.
Length of platform over dashers	5 ft. 9 in.
Width over all	8 ft. 5 in.
Height rail to trolley base	12 ft. 5 in.
Roof	Arch
Air brakes	Westinghouse with DH-16 compressors
Control (type)	Westinghouse K-35 double end
Curtain material	Pantasote
Destination signs	Hunter
Door	Double doors, opening 48 in. in the clear
Door opening mechanism	Pneumatic Devices Company, two door engines, and one selector valve per opening
Fenders	H. B. Life Guards
Handbrakes	Peacock Staffless
Headlights	Golden Glow SM 95
Motors	Four Westinghouse No. 508 AN
Fare boxes	Johnson air-operated with coin separator
Registering devices	Dapron air-driven register mechanism and air box motors
Seats	Brill Co. Waylo special reversible
Seat material	Canvas lined rattan
Trolley catchers	Keystone
Trolley base	Simplex No. 3
Trucks	Brill 77-E trucks with friction bearings
Wheels	28-in. Davis cast steel

Maumee Valley Railways & Light Company, Toledo, Ohio, will use the Nic Le Grand, Inc., positive safety appliances for seven new cars.

Michigan Railroad, Jackson, Mich., has placed a fifth repeat order with Nic Le Grand, Inc., for safety appliances for ten more cars.

Cincinnati, Lawrenceburg & Aurora Electric Street Railroad, Cincinnati, Ohio, will use the Nic Le Grand, Inc., positive safety appliances for seven converted cars.

Detroit (Mich.) Municipal Railway will be provided with funds for the purchase of 200 cars through the passage at the election on April 2 of a bond issue authorizing the expenditure of $5,000,000 for extensions and improvements.

Cumberland County Power & Light Company, Portland, Me., has placed a contract with the Wason plant of the J. G. Brill Company, for six new steel passenger cars at an approximate cost of $13,000 each. The cars will be arranged for either one-man or two-man operation. They will have a seating capacity of forty-eight.

Track and Roadway

Knoxville Power & Light Company, Knoxville, Tenn., has started the construction of the Walnut Street crossover line, which is to cost the company about $24,000.

Portland Railway, Light & Power Company, Portland, Ore., will expend at least $500,000 during the year in track improvements. Details of the improvements have not yet been worked out.

Hydro-Electric Power Commission, Ont., Canada, has announced, through Chief Engineer F. A. Gaby, that improvements to the Hydro-Electric Railways (Essex District) will be completed this year at a cost of $760,000.

Puget Sound Power & Light Company, Bellingham, Wash., has been granted permission to install switches and other curve work at the intersections of Elk and Holly, Dock and Holly and Holly and Bay Streets.

Akron, Canton & Youngstown Railway, Akron, Ohio will spend more than $250,000 for track and property improvement. Of this sum, at least $150,000 will be spent for improvement to the right-of-way, while the remainder will be used for the development of roundhouse and yard facilities.

Interborough Rapid Transit Company, New York, N. Y., during 1922 expended $1,400,000 to maintain its subway and elevated tracks, not including the supporting structures or tunnels, and keep them safe for the operation of 7,000 trains a day. Including both subway and elevated lines, 22 miles of single track of new rail were relaid and 37,500 ties were replaced. A total of 385,000 ft. of planking was used to construct and repair walks along and between the tracks on the elevated lines and the viaduct sections of the subway.

Power Houses, Shops and Buildings

Columbus Electric & Power Company, Columbus, Ga., has perfected plans for the construction of a service building, work on which will start within the next few weeks. The building will cost approximately $35,000 or $40,000.

Beloit, Wis.—Fire of unknown origin in the carhouse of the Rockford & Interurban Railway did much damage recently to electrical equipment such as motors, armatures and coils, in addition to the destruction of belting shafts and valuable tools. Three city cars and an interurban car which were in the building at the time were not damaged.

Indianapolis Ind.—Plans are maturing for the erection of a traction freight terminal in Indianapolis on a plot of twelve acres known as the old Greenlawn Cemetery site. The Terminal Realty Company has a freight house on the location, but it is inadequate to the needs of the roads. The new terminals will cost more than a million dollars when completed. The plans are being worked out by Robert I. Todd, president of the Terre Haute, Indianapolis & Eastern Traction Company; Harry Reid, president of the Interstate Public Service Company; Charles L. Henry, president of the Indianapolis & Cincinnati Traction Company, and Arthur Brady, president of the Union Traction Company of Indiana.

Connecticut Company, New Haven, Conn., is planning to build a combined carhouse and bus garage in Waterbury on West Main Street, where it now has some car shops and other buildings. The problem will be to put up the new buildings without interfering with the operation of the line. It is expected that the new carhouse will have a capacity of 105 cars and the garage a capacity for sixteen buses, twelve for storage and four for repair. There will also be a new paint shop to go next to the present repair shop, and altogether it is expected that the installation will cost between $400,000 and $500,000. The company has also got to build a carhouse at Meriden to take the place of the one burned down Feb. 5.

Trade Notes

Wendell & MacDuffie, New York, have moved from 30 Church Street to the new Bowery Savings Bank Building, at 110 East Forty-second Street, New York.

Carnegie Steel Company, Pittsburgh, Pa., has received the order for the rolled steel wheels to be used under the 576 cars recently ordered by the Philadelphia Rapid Transit Company.

Standard Underground Cable Company, Pittsburgh, Pa., wishes to have all communications to the general offices on and after April 1 directed to 100-108 Seventeenth Street, Pittsburgh, instead of to the Westinghouse Building.



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Positive Safety Appliances

have been in operation for over three years in Davenport, Rock Island and Moline. There are 150 cars on these systems.

Forty cars are now equipped with these Safety features on the Michigan Railway and the fourth repeat order has just been received—making 50 cars on that property.

Twenty-seven (27) new Safety Cars for the Kentucky Traction and Terminal Company will be equipped with **Positive Safety Appliances.**

Lower First Cost

Lower Installation Cost

Less Weight—Less Piping

Operation Smooth and Positive

Drawings and Details upon request

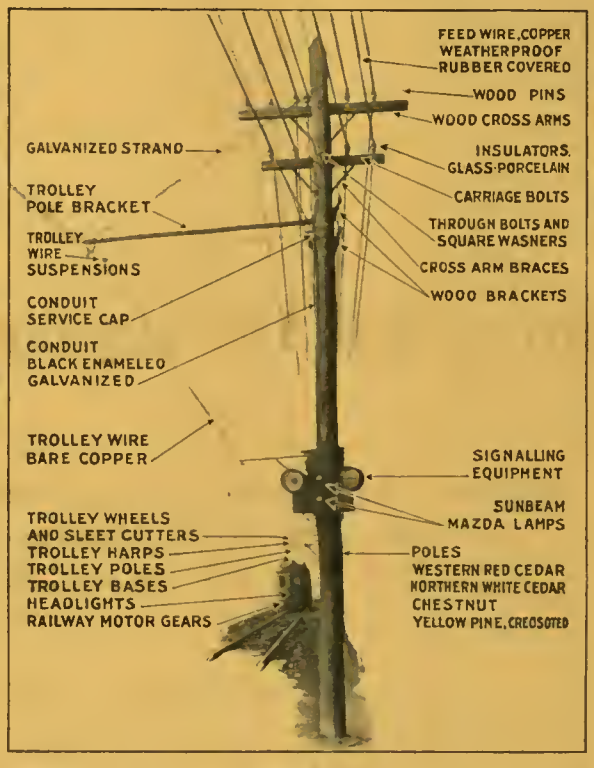
Nic Le Grand Inc.

ROCK ISLAND
ILL.

















A Way to Simplify and Reduce the Cost of Buying and Stock-keeping

Everything for the outside plants from the bottoms of the holes to the tops of the poles is obtainable through our House near you.

One order to this nearby House brings everything.

Stocks, nearness and experience combine to provide an emergency service at an emergency pace.

Learn now what this House can do to simplify and reduce the cost of your selecting, buying and stock-keeping.

A NATIONAL ELECTRICAL SERVICE

Western Electric Company

OFFICES IN ALL PRINCIPAL CITIES

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TRANSPORTATION
Complete Transit Surveys and Development Programs, adapting Motor-Transport, R.R. Terminal and City Plans. Traffic, Service, Routing, Operation and Valuation.
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Transmission Line and Special Crossing Structures, Catenary Bridges
WRITE FOR OUR NEW DESCRIPTIVE CATALOG
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50 Church St. *Street Railway Inspection* 131 State St.
NEW YORK DETECTIVES BOSTON

When writing the advertiser for information or prices, a mention of the Electric Railway Journal would be appreciated.



Bhi

The Zulus believe in the transmigration of souls. The dead are supposed to become animals, reptiles, stones, or trees.

For this reason they sometimes question each other before killing a snake or butchering a goat, saying, "Does it resemble your *makula* (grandmother) or your *bhi* (brother) who are dead?"

We don't know whether there is anything in this transmigration idea or not, but it's a safe bet that the operator who monkeys around with the boys who sell cheap brushes *usually becomes the goat.*

And, as everyone knows, the rations that go to the goat are Walking Papers and the well-known Can. Not so good.

Better to use only the best brushes scientifically prescribed. Yes, *Morganite!*

Morganite Brush Co., Inc.

Main Office and Factory:
519 West 38th Street, New York

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Electric Power Equipment Corp., 13th and Wood Sts., Philadelphia
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They won't have to open up this place again. It's a

THERMIT RAIL WELD

Read this report from Indianapolis

"Our experience based on four years is very favorable and is proven by your increased orders for 1922"—so says the Engineer of the Indianapolis Street Railway. They have about 2000 THERMIT WELDS now.

Every THERMIT RAIL WELD installed means that another joint is eliminated—another source of trouble and expense is done away with. It is not a different kind of joint—it is a practical means of making continuous rail out of separate pieces. No joint plates, no bolts, no copper rail bonds.

Even under the heaviest traffic—Thermit Rail Welds last like the rail itself.

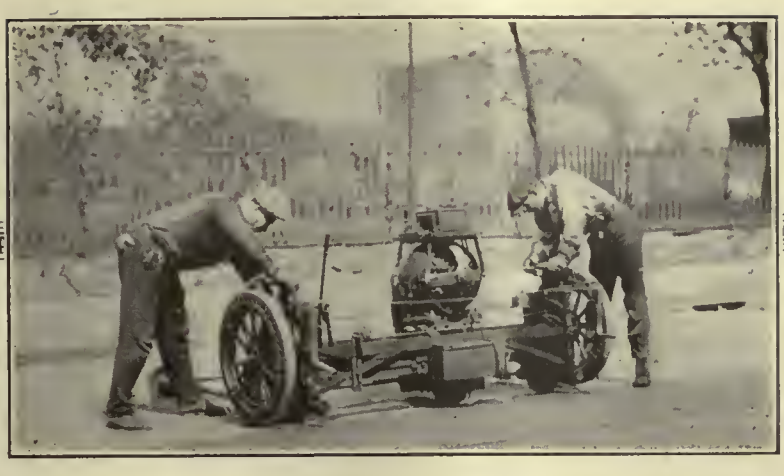
The first cost of Thermit Rail Welds is now comparable with that of any good type of joint. And in this case—

"The First Cost Is the Last Cost"

Metal & Thermit Corporation

120 Broadway, New York

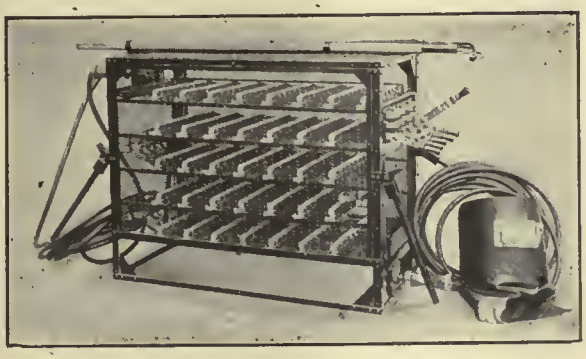
PITTSBURGH CHICAGO BOSTON S. SAN FRANCISCO TORONTO



"UNIVERSAL" Rotary Track Grinder

Has tilting grinding wheel for accurate finishing

Around special work, switches, mates, frogs, and crossings, and for all kinds of grooved rail, this tilting wheel feature of the Universal Rotary Track Grinder, is invaluable. It avoids the necessity of constantly dressing the grinding wheel to accurately fit the work. By a simple adjustment, the wheel is tilted to any desired angle to reach the exact spot where grinding is needed. Other outstanding features of this machine are its direct motor drive, large rubber-tired derail wheels, and adjustable outrigger.



"Atlas" Rail Grinders

Peculiarly adapted for following up welding operators. "Atlas" Rail Grinders are light, fast, and efficient. Approach and run-off at welded spot can be ground down smooth at one setting of the machine which has a 30-inch carriage travel.

"Ajax" Electric Arc Welder

Light in weight, but of highest capacity. Even at low line voltages its output is high—for example 200 amperes at 300 volts. Complete equipment furnished with each machine.

"Reciprocating" Track Grinders

For quickly and thoroughly removing corrugations, these machines are unexcelled. Furthermore, they restore the original contour of railhead, because the grinding blocks shape themselves to fit it, instead of grinding to a flat surface.

RAILWAY TRACK-WORK COMPANY

3132-48 E. Thompson St., Philadelphia, Pa.

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IN YOUR BUDGET

Deciding About That Track —OLD or NEW, is EASY

The best is the cheapest—and when the cheapest is the best no need to hesitate. Get prices on the "Ideal Track" the "Continuous Rail" kind, that is

"Jointless", "Bondless" and "Costless"

Indianapolis Welded Joints.....Exterminate maintenance
Indianapolis Welded Joints.....Low in cost, high in efficiency
Indianapolis Welded Joints.....Super-rail, strength and conductivity
Indianapolis Welded Joints.....Any rail, anywhere, any time
Indianapolis Welded Joints.....Proven in performance—10 years' test
Indianapolis Welded Joints.....In use on over 125 different rails
Indianapolis Welded Joints.....In 200 cities, 48 states
Indianapolis Welded Joints.....The last word in track economy

INDIANAPOLIS *Welded Joints*

Applied with the Indianapolis Electric Welder and with Indianapolis Fluxated Welding Steel.

Insures Dependable, "Continuous Rail Track," the only kind of track that will ELIMINATE MAINTENANCE, PRESERVE PAVING, CONSERVE CARS

Thoroly Dependable—Inexpensive—No Bolts—No Bonds—No Maintenance.

The Proof of the Product Is In the Performance

ONE SAYS: Have installed 3,000 pairs since 1917. Thoroly satisfactory and efficient in every respect. Economical and adopted as **standard.**

ANOTHER SAYS: Have over 6,000 pairs, first installed in 1913, consider them thoroly practical and satisfactory, standard with us.

ANOTHER SAYS: About 2,500 pairs installed since 1907, with very gratifying results.

ANOTHER SAYS: Installed 2,400 pairs, beginning in 1916, with very satisfactory results.

ANOTHER SAYS: Since 1912 have used about 3,000 pairs, standard for our paved tracks.

ANOTHER SAYS: Only begun in 1919, with 500 pairs, uniformly good results.

ANOTHER SAYS: Joints welded in 1916, no maintenance and track apparently "Jointless" today.

ETC., ETC., ETC., ETC., ETC., ETC., ETC.

That "INDIANAPOLIS" *Welders, Steel and Joints*

ARE GOOD, is our claim. That they DO GOOD, is your opportunity. That they have MADE GOOD, is conclusively proven, in that many properties owe their present existence to the use of these products, which are saving hundreds of roads, MILLIONS of DOLLARS ANNUALLY.

To Users—The MORE you USE the MORE you SAVE
To Not-Yet Users—JOIN THE SAVERS

Get our proposition for comparison

The Indianapolis Switch & Frog Co.

SPRINGFIELD, OHIO

J. J. Costello Boston, Mass. New England Representative



The Brooklyn Rapid Transit Company keeps car seats bright and fresh with

BECKWITH-CHANDLER

Cane Seat Varnish

Rattan seats look fine when new! But unless their bright unblemished surface is covered with adequate and suitable protective coating, it soon becomes grimy, stained and repugnant to any passenger possessing the least bit of refinement.

That's why a road like the Brooklyn Rapid Transit Company for over three years has been coating every cane seat, before it goes into service, with Beckwith-Chandler Cane Seat Varnish. It is a special preparation for this particular purpose, nothing else like it has ever been placed on the market. Used to cover new seats, and refinish old ones.

BECKWITH CHANDLER CAR FINISHES SELL TRANSPORTATION

Beckwith-Chandler Company
203 Emmett St., Newark, N. J.
320 Fifth Ave., New York, N. Y.

Announcing-Seamless BIAS Tape

to Engineers Coil Winders, Repair Shops Motor, Transformer and Cable Manufacturers

Furnished in—
Widths ½ in. and wider.
Lengths 36 and 72 yd rolls.
Thickness .005 to .015 in.



Seven Factors of Quality

High Dielectric Strength
High Resistance
Flexibility
Non Hygroscopic
Heat Resisting
Chemically Neutral
Maximum Elasticity

IRVINGTON seamless bias tape varnished cambric is made in widths of ½ in. and wider. Length 36 and 72 yd. rolls. Thickness .005 to .015 in. The advantages of a SEAMLESS over a sewed bias tape are: It can be continuously wound without the necessity of stopping to cut out a seam. Absence of seam avoids air pockets and the consequent lowering of dielectric at that spot. Can be wound with a taping machine. Will successfully supplant method of insulating with linen tape and the subsequent impregnation with insulating varnish. Seamless bias can be wound with lap instead of butt joint.

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E. M. Wolcott, Rochester
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IRVINGTON VARNISH & INSULATOR CO.
Irvington, New Jersey.

Established 1905

LARGEST MANUFACTURERS OF VARNISHED CAMBRIC IN THE WORLD

"NATIONAL" TUBULAR STEEL POLES

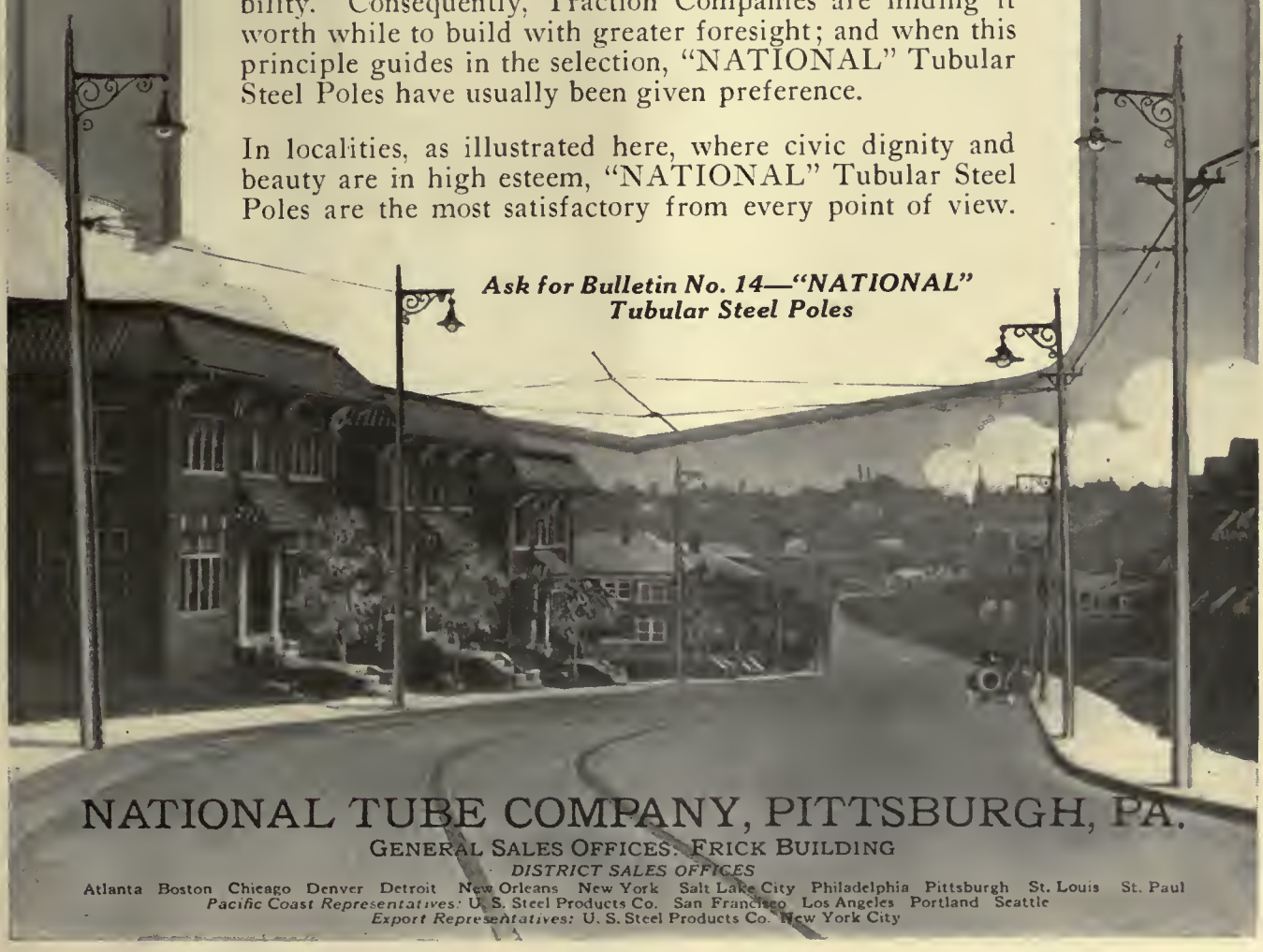
Coming Into Their Own

FOR electric traction overhead construction *ultimate* economy has indisputable advantages over *initial* economy. A more general realization of this fact is evident in the greater use of tubular steel poles. They are "coming into their own."

More consideration is being given today to Safety, Strength, Durability, Upkeep, Appearance and General Dependability. Consequently, Traction Companies are finding it worth while to build with greater foresight; and when this principle guides in the selection, "NATIONAL" Tubular Steel Poles have usually been given preference.

In localities, as illustrated here, where civic dignity and beauty are in high esteem, "NATIONAL" Tubular Steel Poles are the most satisfactory from every point of view.

Ask for Bulletin No. 14—"NATIONAL" Tubular Steel Poles



NATIONAL TUBE COMPANY, PITTSBURGH, PA.

GENERAL SALES OFFICES: FRICK BUILDING

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Atlanta Boston Chicago Denver Detroit New Orleans New York Salt Lake City Philadelphia Pittsburgh St. Louis St. Paul

Pacific Coast Representatives: U. S. Steel Products Co. San Francisco Los Angeles Portland Seattle

Export Representatives: U. S. Steel Products Co. New York City

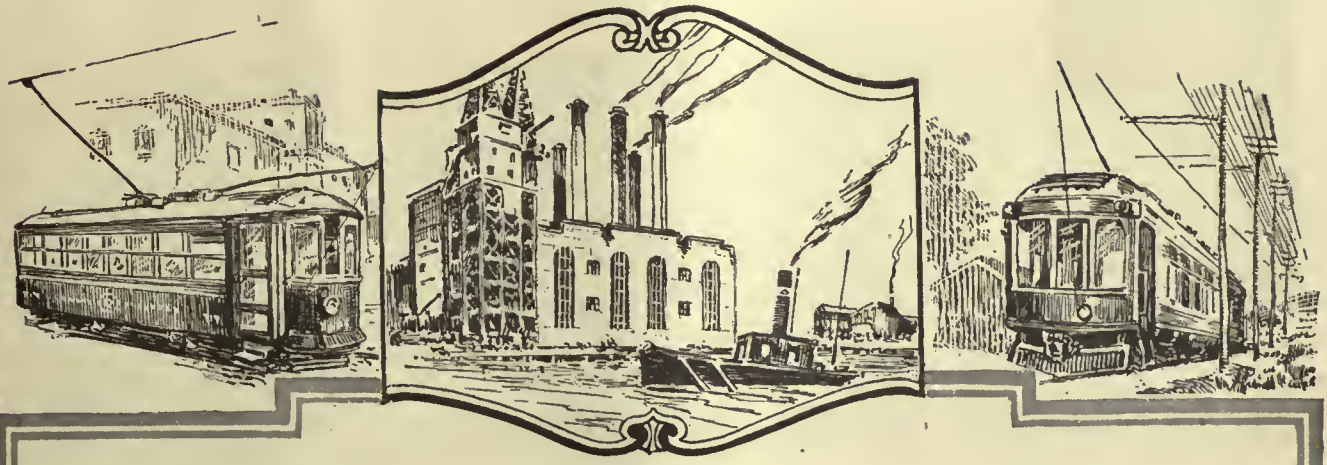
COLLIER SERVICE sustains car card space value by maintaining a nation-wide organization of car advertising experts.



CANDLER BUILDING, THE HOME OF COLLIER SERVICE

Barron G. Collier INCORPORATED

CANDLER BLDG NEW YORK





Spring Is Here!



WELL? — It comes every year, doesn't it?

True enough and every year the Electric Street Railways have to meet certain operating conditions which have a seasonal phase.

Being in the oil business we'll stick to that end of it.

So, then, at this time of the year it is proper to begin changing over to

Texaco *Summer* Electric Car Oil
Texaco *Summer* Air Compressor Oil
Texaco *Summer* Gear Lubricant
Texaco *Summer* Curve Oil
Texaco *Summer* Curve Grease.

And here is why:

All oils tend to become a little lighter; a little more fluid in warm weather.

The fluidity of oil is expressed in terms of viscosity. Viscosity varies with temperature.

In the application of lubricants to street cars, it is the operating temperature that counts.

As the weather gets warmer the oils you used all winter will thin out. They will not feed at the same rate.

You can't change the temperature, but you can change the oils to compensate.

But weather doesn't change at a given date, so here's what we recommend:

Compensate gradually. Begin now (middle of April) adding steadily small quantities of heavier oils to the lubricants now on the cars. This will gradually raise the viscosity, keeping it normal as Summer advances.

Then all the time, even in the "dog" days, you will be fully protected by these carefully refined Texaco Lubricants.*

* * * * *

As conditions vary throughout the country, watch the thermometer more than the calendar and you will not be caught off-guard.

We have worked out an interesting and economical method of making this change on roads all over the country and we will consider it a privilege to have our Texaco Lubrication Engineers discuss it with you in person.

There is a Texaco Lubricant for Every Purpose

* In the late Fall reverse the process gradually lowering the viscosity of the lubricants so that under the cold of winter the oils will have the proper fluidity.

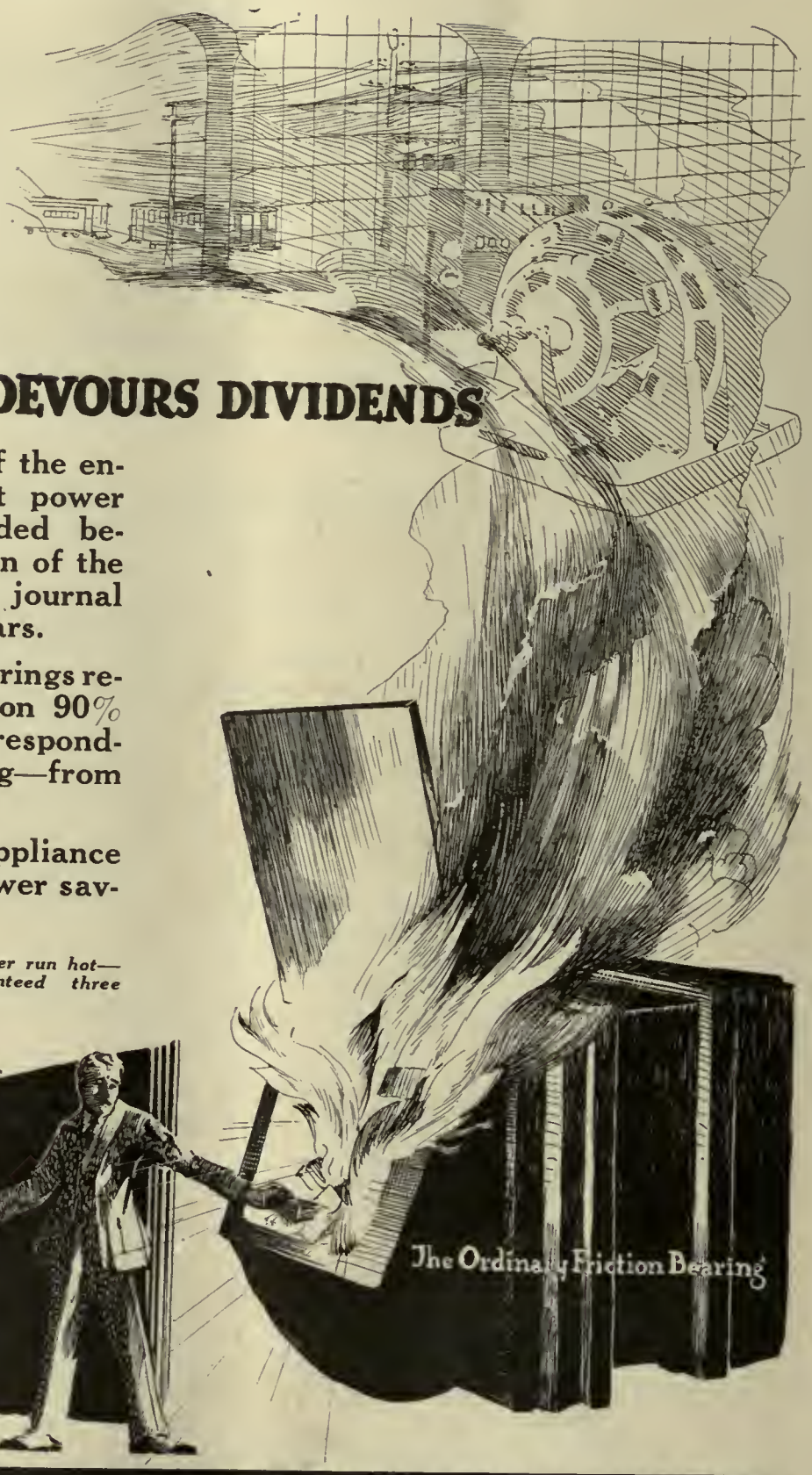




THE TEXAS COMPANY
DEPT. R-J. 17 BATTERY PLACE - NEW YORK CITY
HOUSTON - CHICAGO - NEW YORK
OFFICES IN PRINCIPAL CITIES







POWER WASTE DEVOURS DIVIDENDS

From 25 to 50% of the energy generated at power stations is expended because of the friction of the antiquated friction journal bearings on your cars.

Stafford Roller Bearings reduce journal friction 90% and produce a corresponding power saving—from 22½ to 45%.

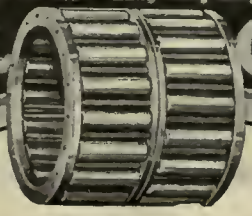
Does any other appliance offer as great a power saving?

Stafford Roller Bearings—Never run hot—Never "freeze up"—Guaranteed three years.



STAFFORD ROLLER BEARING CAR TRUCK CORPORATION

LAWTON MICHIGAN



"IT ROLLS THE FRICTION AWAY"



Miller Trolley Shoes

(patented)

Larger contact area

means—

1. Greater current collecting capacity.

Its large surface, continuously in contact with the wire, keeps the current flowing constantly and practically without resistance. Large current drafts do not overheat it.

2. Less wear and tear—no arcing.

Only two-thirds the trolley tension is needed. The smooth, gentle rubbing eliminates arcing and reduces the frictional wear on wire as well as on the contact device itself.

3. And consequently lower costs

are secured because the Miller Trolley Shoe gives far greater mileage than wheels. It does not arc and burn the wire, nor does it jump and tear down spans.

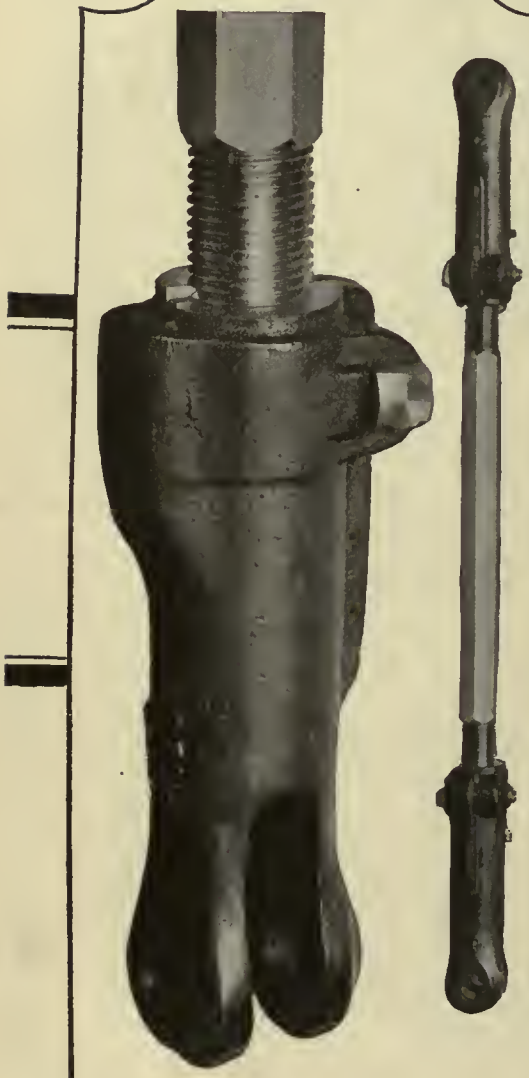
Try it out yourself

Miller Trolley Shoe Co.

Boston-21, Mass.

Western Representative:

Economy Electric Devices Co.
1590 Old Colony Bldg., Chicago, Ill.





EZIREYOB

—don't be backward about it!

Begin now gradually to "BOYERIZE." Inside of a couple of years then your rolling stock will be 100% equipped with "Boyerized" car parts and the installations made two years before will still be good for one or two years to come—*that's the way "Boyerized" parts wear!*

The New Turnbuckle

Instead of a big coarse-threaded jam nut that needs a two-fisted wrench for application you require only a pocket-size wrench that is applied at a convenient angle. The secret? The jam-nut idea is replaced by a split clamp with a spring power that won't be loosened once the little nut on the side has been tightened.

This new turnbuckle will last as long as the truck, because—

It's Boyerized

Other BOYERIZED Parts

Brake Pins
Brake Hangers
Brake Levers
Pedestal Gibs
Brake Fulcrums
Center Bearings
Side Bearings
Spring Post Bushings
Spring Posts
Bolster and Transom Chafing Plates
MacArthur Turnbuckles
Manganese Brake Heads
Manganese Truck Parts
Bushings
Bronze Bearings

Boyerized Parts cost slightly more because they last three or four times as long as parts of ordinary untreated steel. Let us quote you on your requirements.

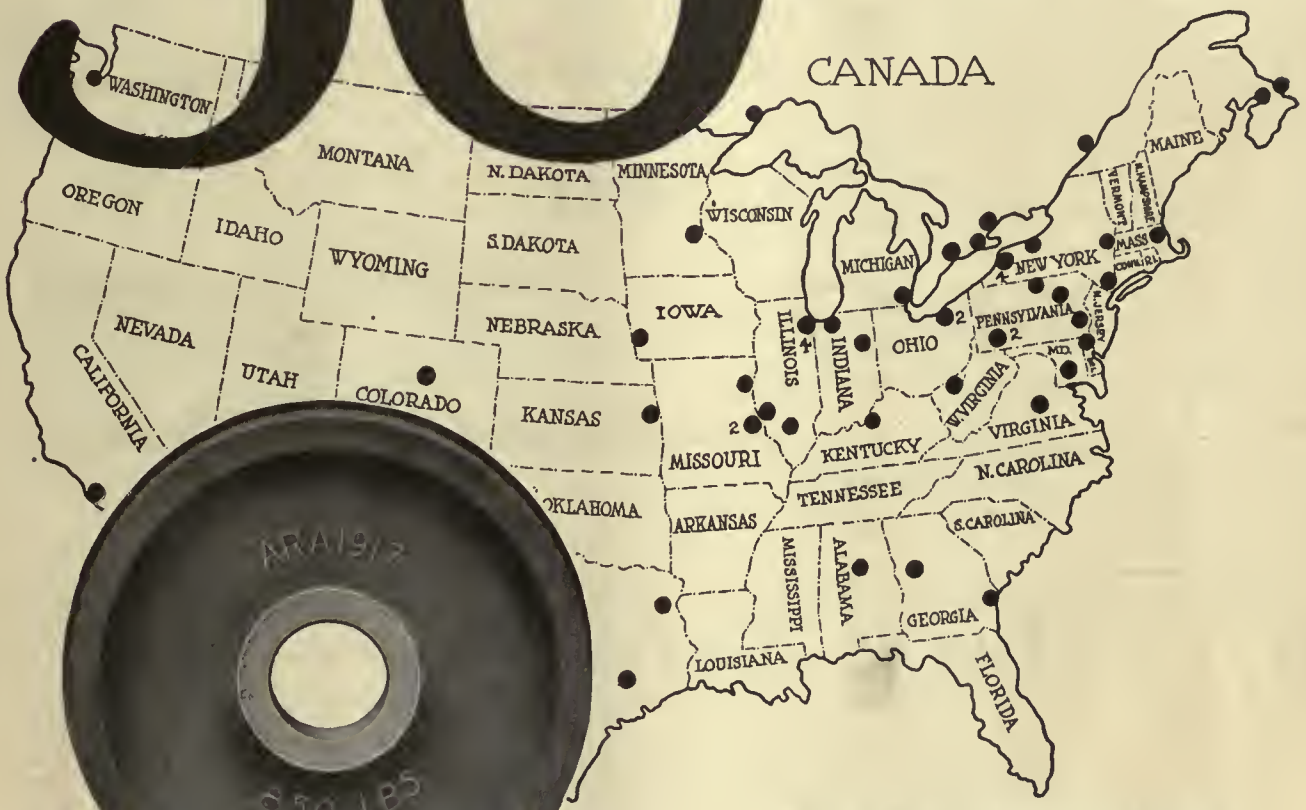
Bemis Car Truck Company

Electric Railway Supplies

SPRINGFIELD, MASS.

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50 Delivery Points



CHILLED IRON WHEELS
for railway and street car service. Capacity 20,000 per day. 25,000,000 in service.

ASSOCIATION OF MANUFACTURERS
OF CHILLED CAR WHEELS
1847 McCormick Bldg., Chicago

THE map above shows the location of the 50 foundries in the United States and Canada, represented by the Association of Manufacturers of Chilled Car Wheels.

Chicago, 4	Sayre, Pa.
St. Louis, 2	Berwick, Pa.
Buffalo, 4	Albany
Pittsburgh, 2	Toronto
Cleveland, 2	New Glasgow, N. S.
Amherst, N. S.	Madison, Ill.
Montreal	Huntington, W. Va.
Mich. City, Ind.	Wilmington, Del.
Louisville	Houston, Tex.
Mt. Vernon, Ill.	Hannibal, Mo.
Ft. Wayne, Ind.	Reading, Pa.
Birmingham	Baltimore
Atlanta	Richmond, Va.
Savannah	Ft. William, Ont.
Boston	St. Thomas
Detroit	Hamilton
St. Paul	Ramapo, N. Y.
Kansas City, Kan.	Marshall, Tex.
Denver	Los Angeles
Tacoma	Council Bluffs
Rochester, N. Y.	

American Railroad Association Standards

650 lb. wheel for 60,000 Capacity Cars
700 lb. wheel for 80,000 Capacity Cars
750 lb. wheel for 100,000 Capacity Cars
850 lb. wheel for 140,000 Capacity Cars

The Standard Wheel for Seventy-Two Years

CHILLED IRON WHEELS

Bates Steel Poles and Public Interest

Do your installations favorably impress and interest the investing public?

The stability of your installation, using Bates Steel Poles as the ***backbone*** of your construction, will reflect the solidity of your organization.

You will find Bates Steel Pole installations lower in initial costs than constructions built with substitute poles.



Bates engineers will gladly co-operate with you in your planning

Bates Expanded Steel Truss Co.

ILLINOIS MERCHANTS BANK BLDG., CHICAGO, ILL.

BATES ONE PIECE EXPANDED STEEL POLES

This Is Station C-A-R

THE BIRTHPLACE OF THE SAFETY CAR



Building Quality Cars
Broadcasting Economical Operation and Durability—Tune In!

Use Quality Cars Built By

St. Louis Car Company

St. Louis, Mo.

"The Birthplace of the Safety Car"

Special Standard Bronze

High Strength Trolley Wire

has no superior among products of this kind for strength, rust-resistance and wear-resistance. Rigid tests in actual service by unbiased engineers have demonstrated the durability of SSB Wire under the most severe operating conditions.

If you are interested in high strength trolley wire write our nearest office for samples and prices of Special Standard Bronze.

STANDARD UNDERGROUND CABLE CO.

BOSTON, PHILADELPHIA, ATLANTA, CHICAGO, ST. LOUIS, SEATTLE, SAN FRANCISCO, NEW YORK, WASHINGTON, LOS ANGELES, PITTSBURGH, DETROIT, KANSAS CITY

FOR CANADA: STANDARD UNDERGROUND CABLE CO. OF CANADA, LTD., HAMILTON, ONT.

STANDARD UNDERGROUND CABLE CO. TRADE MARK

ANDERSON LINE MATERIAL

with

Aetna Insulation



Round Top Straight Line Suspension



Adjustable Insulated Crossover

For over twenty years, Anderson Line Material has been a leader in the field because of its eminently satisfactory and long service. Aetna Insulation has helped to make this reputation for it.

Aetna Insulation is our own special compound. Developed years ago, it has continued ever since to meet the exacting requirements of electric railroad line service.

—Let us send our catalog—

TRADE A MARK

Reg. U.S. Pat. Off.

Albert & J. M. Anderson Mfg. Co.

Established 1877

289-293 A St., Boston, Mass.

Branches—New York, 135 Broadway. Philadelphia, 429 Real Estate Trust Bldg. Chicago, 105 So. Dearborn St. London, E. C. 4, 38-39 Upper Thames St.

TRADE E A AETNA MARK REGISTERED

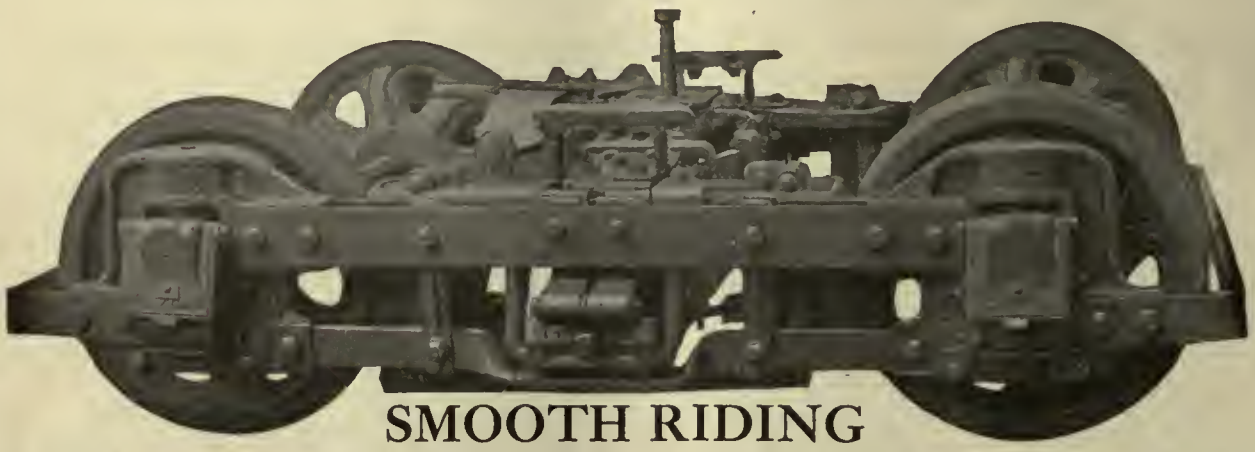
R. H.

TAYLOR REDUCED HEIGHT TRUCK

WITH

S. A.

TAYLOR STRAIGHT ACTION BRAKE



SMOOTH RIDING
LOW MAINTENANCE COST—Absolute Safety

Center Plate Height 22¾ in. with 26 in. Diam. Wheels

For Modern Low Level Double Truck Cars, the Taylor R. H. Truck, equipped with Taylor S. A. Brake, with large diameter hard steel pins, will provide the best possible service results from every standpoint.

TAYLOR ELECTRIC TRUCK CO., TROY, N. Y.

SPECIFICATIONS ON REQUEST Established 1892 SEND FOR PORTFOLIO



AA-7B Railway Air Compressors

In the City of Seattle service

A single-acting duplex compressor with crankcase and cylinders integral.

One-piece cylinder-head for both cylinders contains suction and discharge valves. Heavily designed crankshaft of high-grade steel turns in journal bearings of ample proportions to insure minimum wear. Herringbone Gears transmit power from motor shaft to crankshaft with practically silent operation. Lubrication is positive and efficient.

ALLIS-CHALMERS PRODUCTS
Electrical Machinery
Steam Turbines
Steam Engines
Gas and Oil Engines
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Mining Machinery

ALLIS-CHALMERS MANUFACTURING COMPANY

MILWAUKEE, WISCONSIN. U.S.A.

ALLIS-CHALMERS PRODUCTS
Flour and Saw Mill Machinery
Power Transmission Machinery
Pumping Engines-Centrifugal Pumps
Steam and Electric Hoists
Air Compressors - Air Brakes
Agricultural Machinery
Condensers

Do it with the Dayton Air Brush

6
Paint Cars
Insulate Armatures
Creosote Timbers
Paint Structures
Clean Castings



Handles all materials from the lightest disinfectant to the heaviest leads and oils without special preparation.

Try It Now

Send for a Dayton Air Brush now, and test it out on all these kinds of work. More than forty electric railways are using it for several or all of these purposes.

With it, any one intelligent worker can do the equivalent of several skilled hand workers, and save material as well.

Dayton Air Brushes weigh 21 ozs.—measure 6½ in. by 11¼ in. high—are made of aluminum and brass—and carry our rigid guarantee against defects. They may be attached to any air line.

The Dayton Air Brush Company
17 Maryland Avenue, Dayton, Ohio

Lightest—Strongest—Simplest—Neatest

That's HALE & KILBURN Seats

Made in a wide variety of styles and finish. A suitable type for every kind of car and every kind of service.



Lightest Weight Stationary Steel Seat

Attractive
Comfortable
Economical

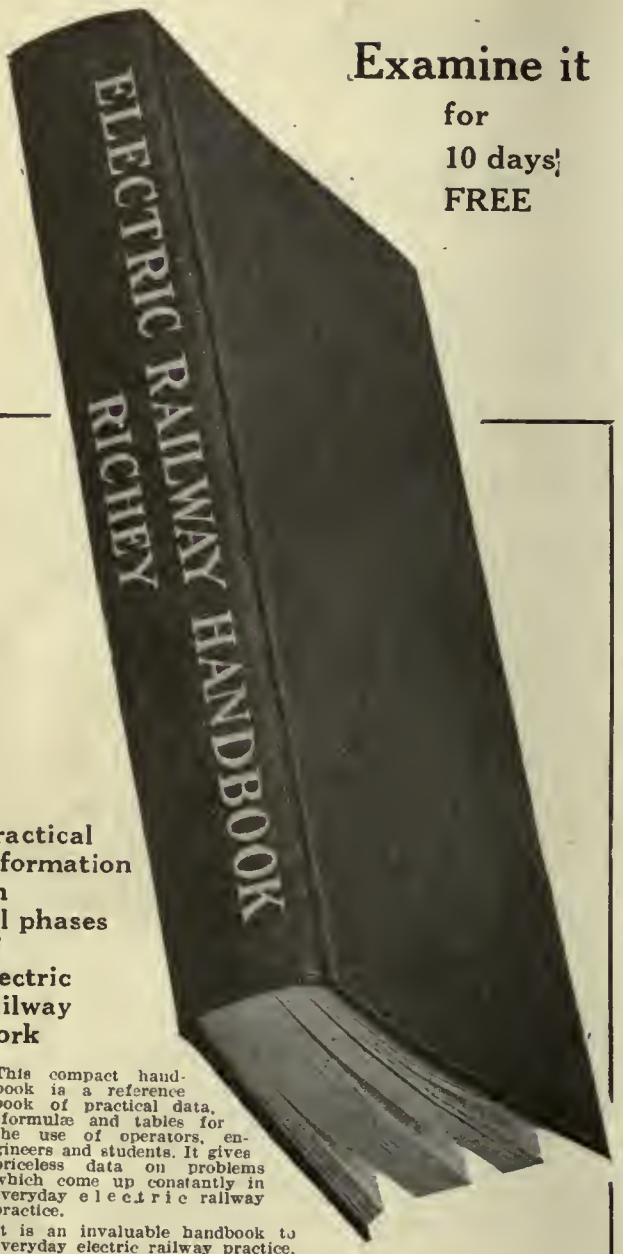


Lightest Weight Walkover Steel Seat

Cost no more than others
Write for particulars

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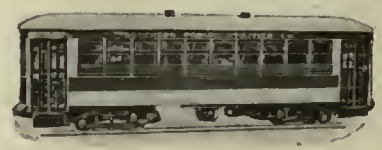
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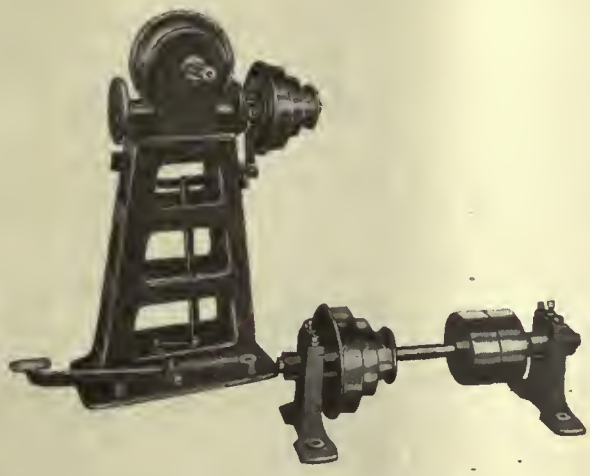
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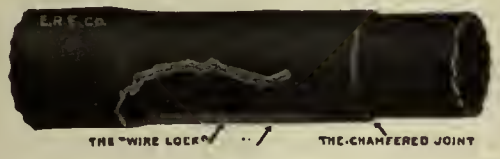
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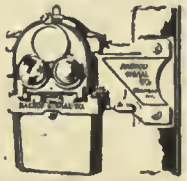


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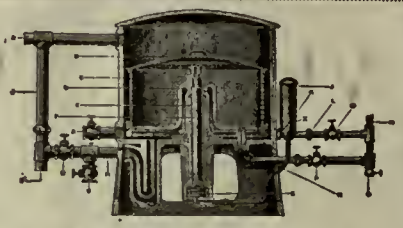
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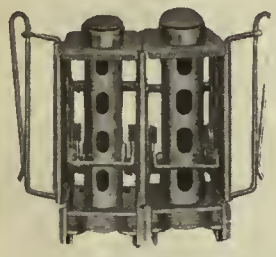
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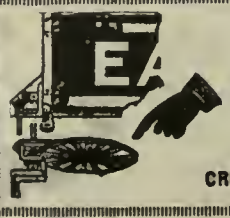
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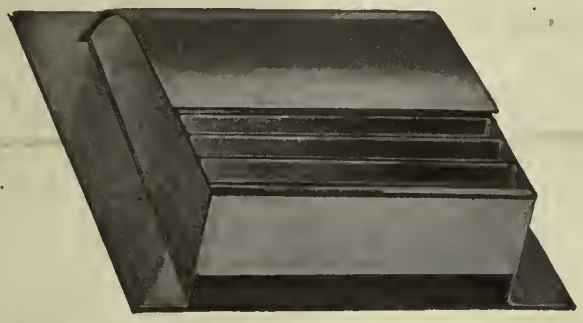
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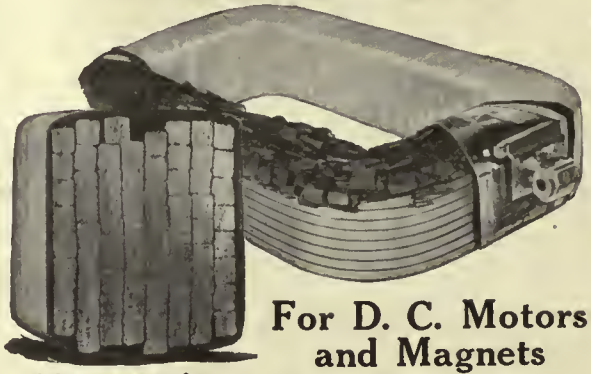
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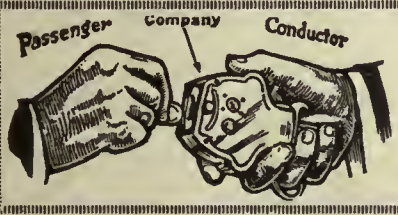
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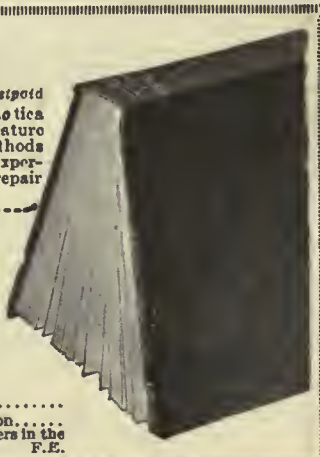
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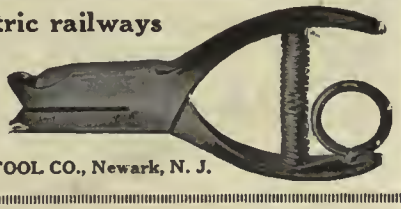
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2—Allis-Chalmers 26 x 36 Corliss horizontal Engines, direct connected to Allis-Chalmers 500 kw., 550/575 volt, 125 r.p.m., generators Nos. 38316 and 38382.

The switchboard equipment for these generators will consist of generator panels only, which includes circuit breaker, ammeter and switches.

The above sets can be seen in operation until May 1st—Pittsburgh District.

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By decree of the Common Pleas Court of Montgomery County, sitting in equity, the Norristown Trust Company, Trustee, will sell at the Court House, Norristown, Pa., in Court room No. 1 at one o'clock P. M. on Monday, April 30, 1923, all the charter and franchise rights, together with all its property, leaseholds, railway and transmission lines, rolling stock, and all property real, personal and mixed, of the Montgomery Transit Company, whose built line extends from Trooper to Harleysville, all in Montgomery County, and about 12¾ miles in length, with contract connections into Norristown and other points. See full advertisement in Norristown Herald. Further information furnished by Trustee. Certified check of $5,000 required to be filed with Trustee one hour before sale by bidders. 10 per cent at close of sale, balance sixty (60) days after confirmation. Knock down price $150,000. Further conditions at sale.

By Norristown Trust Company,
Trustee.
Aaron S. Swartz, Jr.
Franklin L. Wright,
Solicitors.
Norristown, Penna.

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1—300-kw., 25-cy. West. Will sell or trade for 60-cy. Converter of same capacity.

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Cars and Controller

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Each $2000.00

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Each 500.00

1—G. E. No. 14 Controller **$50.00**

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The Searchlight Section of this paper,

is devoted exclusively to the advertising of idle used and surplus new equipment, and all other business "Opportunities" identified with the field covered by this paper.

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0310

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Item 2—3 type WC, 60 cy., 900 kvs., 13,200-6600 v. primary, 368 v. secondary, water-cooled Transformers with 10% taps above and below normal and 50% starting tap.

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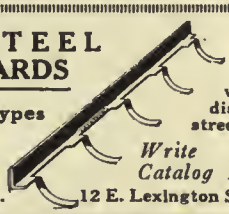
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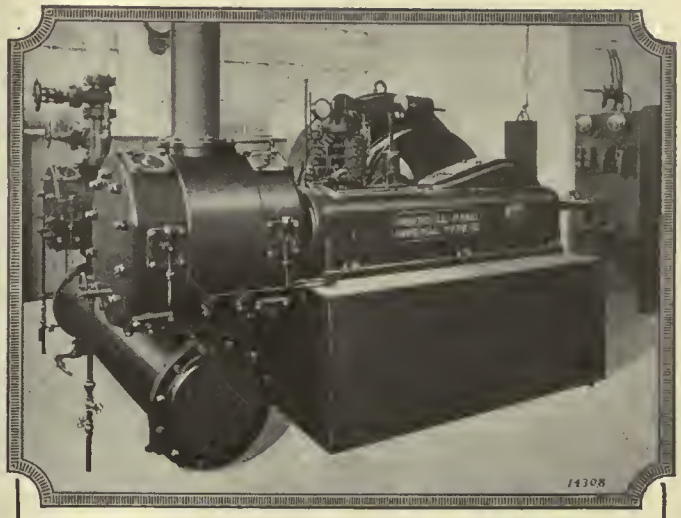
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Be sure your air compressor will perform reliably and that its regulation will give you **efficient performance at full and partial loads.**

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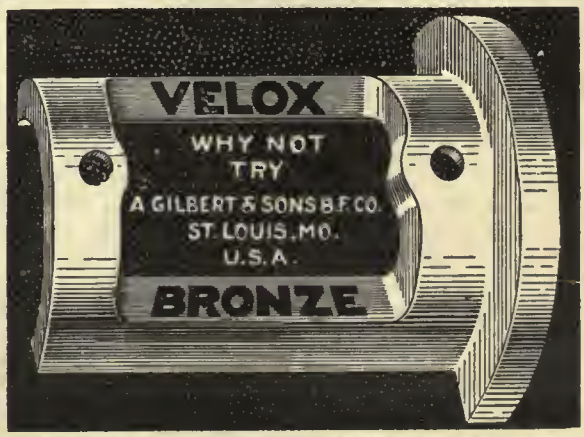
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60 H.P. Railway Motor

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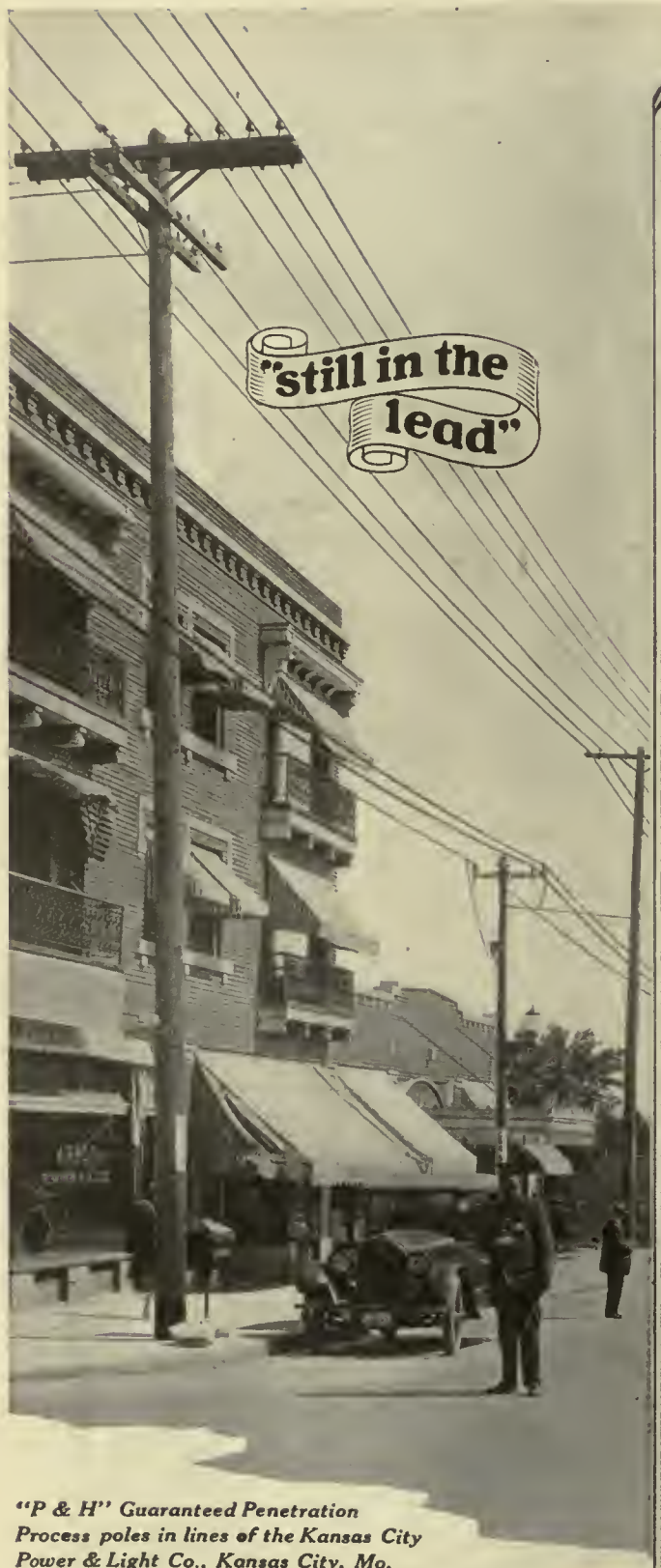
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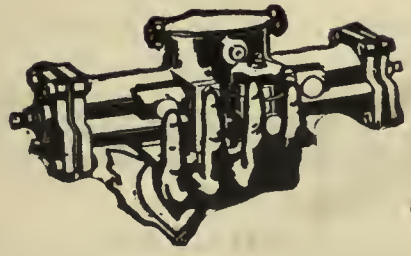


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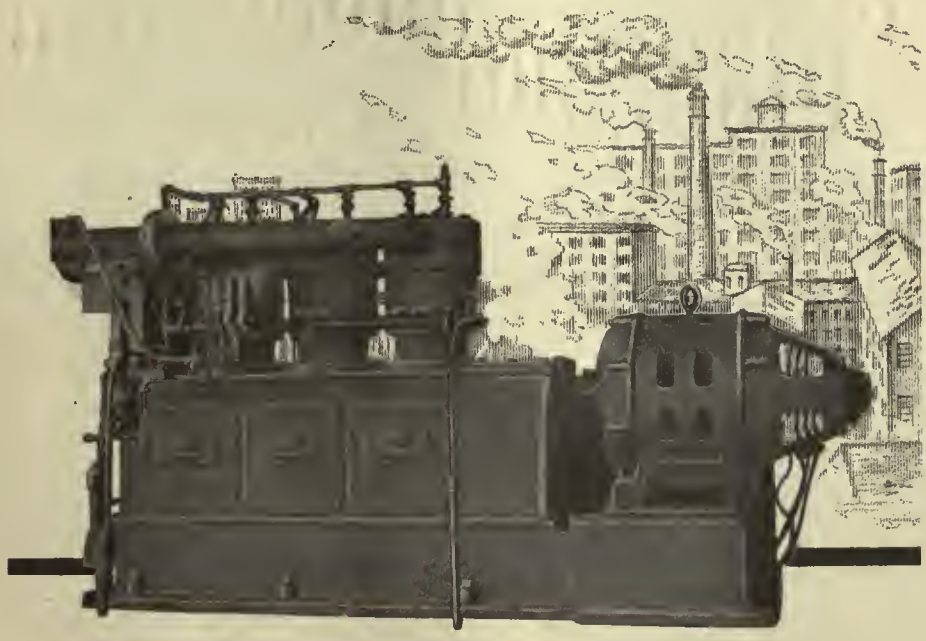


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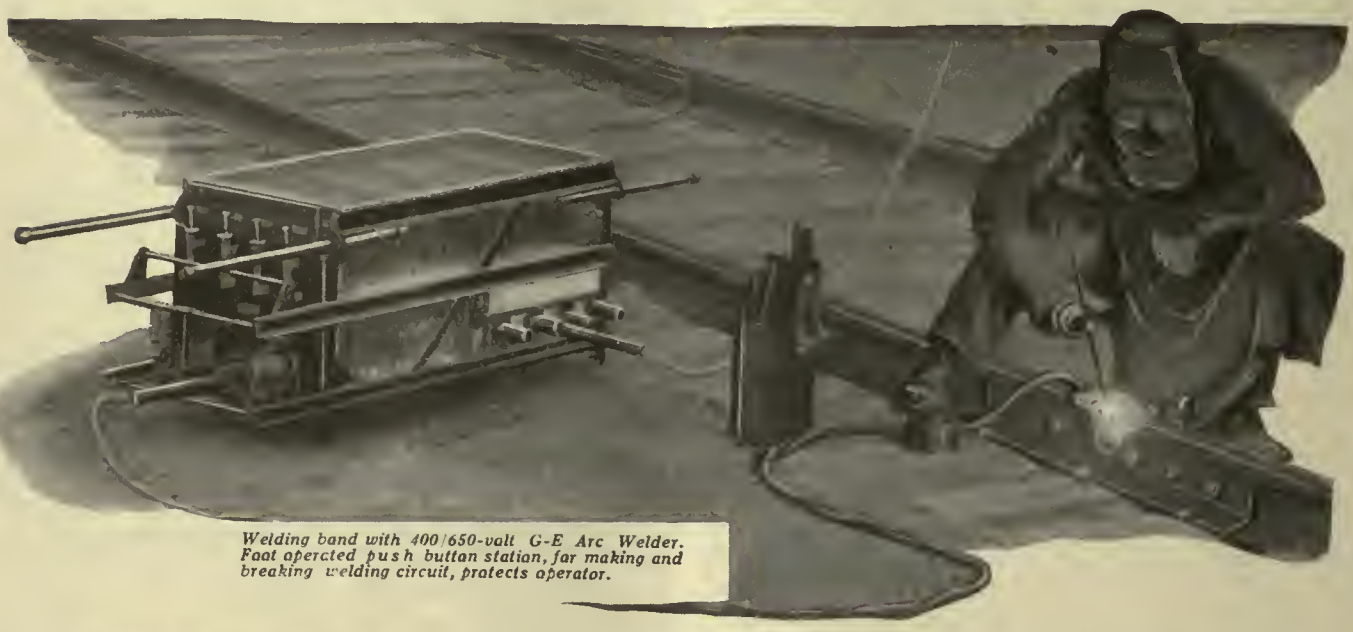
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ELECTRIC RAILWAY JOURNAL

Consolidation of Street Railway Journal and Electric Railway Review
Published by McGraw-Hill Company, Inc.
HENRY W. BLAKE and HARRY L. BROWN, *Editors*

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Engineering Science Gets Substantial Impetus in England

ANNOUNCEMENT has been made that the famous pioneer builder of high-speed vessels, such as torpedo-boat destroyers, Sir Alfred Yarrow, has given £100,000 to the Royal Society (of Great Britain) for the promotion of engineering research. In doing this he follows the excellent example of Ambrose Swasey, Warner & Swasey, Cleveland, Ohio, who some years ago gave practically the same sum, or $500,000, for a similar purpose in this country. The Engineering Foundation is the result of the Swasey gift. It is performing, in a quiet way, a useful service, by encouraging that fundamental investigation upon which industrial progress ultimately depends.

The electric railway industry in Great Britain, America and elsewhere will benefit by such noble gifts as those of Swasey and Yarrow. The Charles A. Coffin Foundation recently established by the General Electric Company will have much the same effect in providing a stimulus to engineering development. Electric railway transportation is an application of engineering of nearly all varieties. Whatever makes engineering sounder at its foundations in the end permits the electric railways to give better service.

High Fixed Investment in Railways Merits Greater Publicity

IN HIS recent address before the Wisconsin Utilities Association, James P. Barnes referred to the lack of understanding that many business men have of the electric railway industry because of its highly specialized vocabulary. He said that while we speak fluently of return on the investment or return on fair value of the property, we refer infrequently to the fact that in this business the usual rate of annual gross earnings is only from 15 to 30 per cent of the amount invested in the property. To put it in terms that the merchant or manufacturer can understand, we should refer to the annual turnover of capital. Many lines of business turn over the capital from two to ten times a year. Naturally it is amazing to find an industry where the capital is turned over but once in from three to six years, as is the case of the electric railways.

This small volume of business on the invested capital is one of the most serious problems of the industry. A merchant invests in stock which he cannot dispose of, but in a few months he is able to close it out, even though at a loss, and stock up with new goods. Before the year is over the loss will be absorbed and forgotten. On an electric railway, however, a mistake, say in the design of cars or track, cannot be forgotten so readily. It must be used intensively for a number of years in order to recover the original cost.

The thought to be emphasized is that realization by the public of the railway problems immediately enlists in most cases fairness and co-operation. That makes it worth while to spend considerable effort on getting the right kind of publicity and having it handled right in presenting it to the public. Mutual understanding might often silence critics who insistently demand lower fares and more service without having any idea of what it is going to cost.

Simplified Practice Next Best to Standardization

WHILE many companies are prevented from adopting various American Electric Railway Engineering Association standards because they cannot afford to throw away equipment and track which is still good for many years of service, there remains much which they can do in the direction of simplified practice, as urged by Secretary Hoover. This is particularly true in the case of lines with a number of operating divisions and also with holding companies.

An inventory of the equipment of the different lines of a holding company, for instance, may show that each of its operating properties has a half dozen or more types of motors of modern design as well as a number of the ancient types. It is quite probable also that an engineering examination of the operating conditions of a property will show that the company can get along very well with two or at most three types of modern motors. The variety of equipment has been brought about either because the motors were purchased in small lots when the railways were being operated separately or because they were bought in large quantities by the head office and distributed in small numbers to the different companies.

In a case like this at least one large holding company is endeavoring to standardize each property on the basis of the minimum number of motors possible on its lines, say two or three. In some cases this may mean the shipment of some motors from one road to another, but it means also the relegation of the less efficient motors to the plows, sweepers and other equipment not often used and to the scrap heap, and confining purchases on each property to two or three modern types. Obviously, much the same practice can be followed with other parts of the equipment, even cars, if the railways are not too far apart so that transportation charges would be too high.

The application of this system of simplified practice has been mentioned in the case of a holding company, but the plan is equally applicable, of course, to a large company with a number of operating divisions, where there is an advantage in having the equipment repair parts in each car inspection shop kept low. Nevertheless, it is undoubtedly true that the smaller company benefits

more proportionately from standardization and simplified practice than the larger company. The latter can afford to keep a large variety of parts in its storehouse, where the smaller company would be overwhelmed by their variety. It is the latter, therefore, that will be most benefited by standardization or this form of simplified practice.

Do the People Want Interurban Rail Service?

FOLLOWING is a letter received by the editor this week from a resident of a rural community. This letter is an editorial as it stands:

"In an issue of ——— *Star* of Jan. 22, we notice an article quoted from your JOURNAL saying, 'Electric Railway Outlook Improving,' which prompted us to ask you a few questions on this subject.

"We are located between ——— and ———, a distance of 27 miles, and, until the war, had a steam line connecting those two cities, a line that was doing a paying business. But on account of the high price of rails, it was junked and rebuilt in France, leaving this territory without a railroad of any kind, a very fertile country of several square miles.

"The main object of this letter is to ask you if you know of some electrical promoter who would connect us up with the ——— — ——— electric lines on the south and the ——— line at ——— on the north. The old roadbed is still intact, and the people are ready to help by either private subscription or vote a subsidy if necessary.

"Can you give us any information as to where we could get in touch with some real-for-sure promoter who could put this project over, or of some financiers who might take it up? We can show that the old road did a good business, as it was the only outlet of this vast territory. As people have found by experience that the trucking business is not a success, they are very anxious for a railroad of some kind. Let us hear from you."

A Great Industry Without Education

IT SEEMS almost incredible, but it is nevertheless true, that the great public utility industry, ranking among the most important fields of endeavor in both investment involved and value to the common good, is practically without representation in the curricula of the colleges. Young men are trained to be engineers, they are taught general economics, they learn something of corporation law, they may get a smattering of regulatory practices, but there is no course of education that might truly be said to be designed to fit young men to enter the public utility field. Here is a great industry, the ramifications of whose business involve in a particular way almost all branches of engineering, the law and business administration. It draws very heavily upon the graduate rolls of the universities for personnel, yet its needs are not directly in view in the planning of courses of education. Only recently has this situation begun to be realized by the universities and by the public utility interests in a constructive way, and both are now giving the matter some attention.

One of the great tasks in this connection is the work of compiling suitable textbooks. This is a rather formidable undertaking, which should have behind it the combined intelligence of a number of the leading minds of the field. It is one which probably would not be accompanied by a sufficient sale of the books to compensate individual enterprise for its efforts. Which means that the utility companies, looking honestly without thought of propaganda toward the development of future personnel, should sponsor, or give financial aid to this work of providing the universities with adequate textbooks, as written and compiled by accepted authorities in each branch of the utility field. It would seem quite in keeping with the demands of the future that many universities should include in their curricula such courses as would permit the student to specialize his last year or two in public utility administration.

Railway for Express Service; Bus for Local Service

PROVIDENCE, R. I., presents some knotty transportation problems for settlement. If ever a city exemplified the idea which the writer of the cowpath poem had in mind it is the city founded by Roger Williams. It didn't name any of its streets after the author of the poem, but it did name one Weybosset as signifying the idea behind the poem. There would not be synonyms enough to go around, but all streets in Providence might be named Weybosset, or the equivalent, so much are they alike. This succession of narrow, winding streets on the cowpath plan would of itself be enough to tax the ingenuity of any transportation management, but in addition to this there are the seven hills on which the city is set with which to contend. Movement of railway traffic through the business district downtown is both slow and hazardous.

It is to help relieve this situation that the United Electric Railways has hit upon the plan of establishing ten distinct loops in the business district, taking all cars off some streets of heavy traffic, and of running trolleys in express service on Broadway from Providence to Olneyville Square, with buses in use for local service over the same thoroughfare. The run is only 1.52 miles, but it is one of the most interesting experiments yet made with buses, for beyond Olneyville Square seven different trolley routes spread out fan fashion. Moreover, the use of the trolleys in express service means that all the people within the area between Barton Street and the center of Providence are being served entirely by motor buses in lieu of trolleys. In other words, the United Electric Railways is voluntarily giving over entirely to vehicles other than its own some of the streets formerly occupied by it, while in the Broadway instance it may turn out that the company, with both trolleys and buses, will eventually monopolize a goodly part of the street. Even to that there can be no reasonable objection when such occupancy has behind it the idea of the greatest good for the greatest number. The lessons to be drawn six months from now from these experiments may prove to be of considerable value to operators elsewhere confronted with similar problems.

President Harding has again shown his grasp of business and employment problems by promptly putting in effect as far as practicable the recommendation of Secretary Hoover and the Conference on Unemployment, headed by O. D. Young, that government construction work should be minimized when times are good and pushed in slack times. This is a matter of interest to electric railways, for if the plan is emulated by the states and cities, the governmental work in dull years will have an appreciable effect in keeping the riding up.



Oakland Pier from Above

At the extreme left is a lumber pier and slip. The next slip is for freight. The next pier contains the main train sheds with the electric station on the left and that for the steam lines in the center and right. Next are the pumping plants and water tanks for terminal supply and fire protection. The slip farthest to the right is for automobiles.

East Bay Electric Service of the Southern Pacific Railroad

Two Million Passengers per Month Use Trains that Must Connect with Boats on Two-Minute Delay Margin—To Meet These Requirements a Precise System of Maintenance Is Followed in Order to Keep Maximum Number of Cars in Service—The Cars Purchased in 1911 Have Given Very Satisfactory Service

IN THE thriving communities on the east side of San Francisco Bay the Southern Pacific System gives a rapid transit service on what is known as its East Bay electrified division. These lines are operated and maintained according to the same standards as main line service and therefore require a highly efficient system of inspection and upkeep. One of the reasons why a high standard of maintenance and reliability is necessary is that the schedules of the ferryboats running across the bay and completing the journey to San Francisco are maintained independently, and all trains must connect with the boats they meet on a delay margin of two minutes. Because of the necessity of simultaneously loading from thirty to thirty-four cars with ferryboat loads of 2,800 to 3,000 commuters during peaks the system of handling traffic at the Oakland and Alameda ferry terminals has received constant study and has been brought to a high degree of perfection.

Features of the East Bay system as a whole were described in the ELECTRIC RAILWAY JOURNAL for Sept. 18, 1915. Recent changes in equipment and some of the features of present methods of operation, maintenance and inspection are noted in the following:

PASSENGER-HANDLING PROBLEM

The electrified division serves parts of Oakland, Alameda, Berkeley and neighboring towns and comprises slightly more than 51 miles of double-track line. Each month it operates approximately 29,000 trains, handling about 2,000,000 passengers. Station stops, approximately 1,500 to 2,000 ft. apart, are made instead of stops at street corners. Trains are scheduled so as to arrive and leave the piers in processional order and are so arranged that no train, when arriving at or leaving terminals, moves through passengers detraining or entering. Most of the traffic is to and from Oakland and Alameda piers, which are the east shore terminals for the ferries that cross San Francisco Bay. With boats operating on a twenty-minute interval, capacity loads are carried on practically all trips during the morning and evening rush hours.

At the San Francisco end of the ferry trip a considerable portion of the business district of that city is within easy walking distance of the ferry, and with the favorable weather that obtains a large part of the year many of the commuters are accustomed to walk the distance between the ferry and their places of business.

On the East Bay side, however, where the property described in this article is located, a different condition obtains. The ferry terminal is several miles from the business district and still further from the residential districts to which most of the commuters go. At this terminal, therefore, all passengers use the electric trains, and during the evening rush hours this means that every twenty minutes the commuters land from two levels of the ferryboat in a period of about two minutes and go directly to the waiting cars.

The fare between San Francisco and all points within



Train Yards at Oakland Mole Terminal

The switch tower at the right controls the movements for all steam and electric trains. In the terminal station, in the background, the electric division uses the structure at the left, covered by a double-truss roof, while the main line steam trains use the higher structure which is located at the right of the electric terminal.

city limits of East Bay cities is the same, namely, 18 cents for a single cash fare, or $4.80 for a commutation book of sixty rides. Collections can therefore be made as the passengers enter the waiting room at San Francisco, thereby avoiding ticket wickets that would cause delay in moving from the boats to the several trains. The boats discharge at both piers on three gangways, two of which are 20 ft. wide and the third 12 ft. wide. The gangway from the upper boat deck leads into a 20 per cent ramp, 12 ft. wide, which affords convenient access to the track level.

Arrangements on the Pier

On the Oakland Mole the main track level is divided into two parts. Main line steam trains occupy one side (twelve tracks) and the local electric trains the other (seven loading and six storage tracks). On the Alameda Mole there are only electric lines, and the entire terminal with eleven tracks is devoted to their use. All electric trains operating out of these terminals have double-end control so that stub-end tracks are used, and the train is ready for the return trip as soon as the motorman walks the length of the train and takes his place in the cab.

Ordinarily cars are operated out of the Oakland Mole on seven routes, leaving from five tracks, and out of the Alameda Mole on three routes, leaving from three tracks. The Oakland Mole carries five tracks in each direction, which includes steam service as well, and the Alameda Mole two tracks in each direction. Large signs, listing the names and destinations of the various routes, are posted in the waiting room on the San Francisco side, also in the depots on the East Bay side and in several places where the passengers cannot fail to see them as they leave the boat. Route signs are displayed on portable stands near the entrances of all trains, and the conductors and brakemen stand on the main floor near their trains to answer inquiries.

A feature of these terminals is the ample space provided for the separation of streams of traffic going from the boat to the several trains. As passengers come from the ramps or the outlets from the main deck gangways, the lines of traffic diverge fanwise in a spacious area around which the trains are waiting. For the purpose



Typical View of Traffic on Oakland Mole

The mole terminal appears in the distance at the left, and the electric trains on the tracks at the right. In the left foreground a switch engine is bringing main line cars from the yard to be made up into trains on the mole. At the extreme left a switch engine is hauling freight cars between the freight yard and the freight ferry slip.

of speedy loading, the cars, which are designed expressly for this service, have very wide entrances and large platforms so that there is a minimum of delay in getting passengers aboard the train. It is not unusual, even during the rush hours, for the first train to leave within one and one-half to two minutes after the first passenger gets ashore, and the last of the eight trains from the Oakland Mole is ordinarily in motion within four minutes thereafter.

To handle the crowds in this way calls for teamwork, not only between various crews but between different departments. An instance of this occurred recently, when a grounded motor caused a circuit breaker to open in the Oakland Mole terminal just as trains from one of the rush-hour boats were moving out. This cut off the power and, of course, left all the trains in darkness. According to the company rules, power could not be restored until the power house was advised that the trouble was cleared. The foreman of the terminal crew knew from observation that what had occurred was limited to one train and that it had cleared itself. He therefore first ordered the power restored, and then, with assistance, went to the train in trouble. The cars were again illuminated and moving within one minute. Within one and one-half minutes from the time the trouble first appeared the train on which the trouble occurred was also under way, completing its run with the disabled motor cut out.

One disadvantage of having a ferry terminal on a mole is the impracticability of having car storage yards near at hand. The Oakland and Alameda Mole trains have to be made up in a storage yard about 2,000 ft. from the ferry terminal. All cut-outs and pick-ups of cars have to be made during the layover period of eight minutes. This time, however, has been found sufficient, even though practically all pick-ups and cut-outs are made from the center portion of the train, and back-up movements are directed either by hand signals or by the engineer changing operating ends of the equipment.

Cars and Equipment

Three types of cars are used, namely, motor cars, trailers and a combination coach and baggage car. The latter is 67 ft. long and seats eighty-eight passengers. The bodies of the motor cars and trailers are alike and they are 72 ft. long and seat 116 passengers. Twenty-one of the trailers have been provided with cabs and operating equipment, so that they can be used as the first car in the train for the purpose of reducing switching and the makeup of trains. The motor cars weigh about 900 lb. per passenger and the trail cars about 600 lb. per passenger.

Each motor car has two 140-hp., 1,200-volt motors per truck, permanently connected in series and geared to a free running speed of approximately 38½ m.p.h. Each motor car has its own current collector; power bus lines are not used in the operation of trains. A 600-volt lighting and control circuit supplied by a dynamotor, however, serves a duplex bus which is run throughout the train to provide current for lighting and control.

Throughout the trains, some of which are made up of as many as eight cars during rush-hour service, there is one nine-point control cable which is coupled to all master controllers and all contactor boxes so that the train can be handled from any cab. This also applies to the air brake equipment, with the exception that air compressor motors are energized direct from the current collectors of individual motor cars.



Oakland Ferryboat Entering Slip

These boats carry 2,800 to 3,000 commuters each in rush hours, and the Oakland Mole Terminal is so arranged that even with this large number of passengers the first train leaves within one and one-half to two minutes after the first passenger gets ashore.

All the cars are equipped with the usual A.R.A. standard coupler and safety appliances so they can be jointly switched in yards with main line equipment, and should emergency require the train coaches can be used in main line service with steam power.

Inspection and Painting System

The electric division has a total of 141 cars in this ferry train service. On the basis of their being repainted at intervals of two years, from six to seven cars are constantly in the paint shop. All of the remaining 134 are needed to handle the daily peak loads. Hence, while there is the advantage of no non-revenue equipment, it is necessary to arrange inspection and



A Stop on the Seventh Street Line with a Seven-Car Train

These cars are 72 ft. long and 10 ft. 5⅞ in. over eaves in width. This makes possible a triple seat on one side of the aisle and a double seat on the other and gives a seating capacity of 116 passengers per car. Each motor car is equipped with four 140-hp. motors and with the regular A.R.A. standard coupler so that they can be switched and otherwise connected with main steam line equipment should emergency require at any time.

maintenance programs so that no cars are kept out of service during either the morning or evening peaks except the six or seven held out for repainting, at which time a general overhauling is also given.

Inspections are made at intervals of 1,200 miles on motor cars and 2,000 miles on trailers. To accomplish this effectively, each inspector is trained to do a certain part of the work and is kept at his specialty without such interruptions as making sick relief or filling such other temporary vacancies that occur in the shop organization. A feature of the company's policy in this regard is to require each inspector to sign a statement covering the condition of that part of the work he has inspected. It is considered as important to let him know when he does good work as when he does not, and in order to keep him informed as to the results he has obtained, the performance records of equipment are regularly shown him. By this means the efficiency of each inspector is a matter of record, the force is strengthened and unsatisfactory labor is promptly eliminated.

Between these 1,200 and 2,000-mile inspections the only work done on the cars, in addition to cleaning, is the renewal and adjustment of brake shoes. The shop where the inspection, repairs and painting are done for all rolling stock of the electric division is at West Alameda and is divided into mechanical and electrical departments, each with its own foreman. The electrical foreman has charge of inspection and also the overhauling of electrical equipment; the mechanical foreman directs all overhauling with the exception of electrical equipment. The paint shop is operated as an adjunct under its own foreman and has no direct relation to the other departments.

Cars are brought in for general overhauling at intervals of twenty-four months on the assumption that the mileage will average 4,000 miles per month. On account of the makeup of trains, some cars make only half this mileage and their equipment is overhauled only at forty-eight-month intervals. However, the repainting is done every twenty-four months, regardless of mileage.

General overhauling consists of stripping the car of all electrical apparatus, excepting the frame of the various control units. The car body and trucks are then sandblasted to take off the accumulated dirt, rust and such paint as requires removal. After all necessary cleaning of trucks and car body, the bottom of the car is repainted by the air-pressure spray process. While the electrical equipment is being cleaned and put in good condition the necessary work on the car body and trucks is done, and the car is then reassembled and moved into the paint shop.

During general overhauling and painting cars are out of service approximately thirty days where repairs are heavy, or less time in proportion to the amount of work to be done. The painting consists of a color varnish process covered with an additional coat of wearing varnish which has been found to give good service for a period of two years. This wearing surface is renewed about four times (or it has about ten years total life) before all paint has to be removed for a fresh start. In this district the salt fogs are very severe, the routes follow the bay shore almost entirely, and the cars are stored on piers over the bay water.

For running repairs, the idle units, such as motors, compressors and dynamotors, belonging to cars being painted are used as exchange units for the purpose



Seven-Car Train Operating Out of Alameda Mole

With trains like these the Southern Pacific Railroad carries commuters living in the East Bay cities of Oakland, Alameda and Berkeley to the ferry slip, whence they cross the bay by ferry to San Francisco.

of reducing shop time on such repairs. This makes extra equipment unnecessary. When released from the paint shop, cars are fitted with trimmings and are given approximately a 10-mile test run before being released for service.

The paint shop is equipped with a hot air heating system to maintain a uniform temperature for varnishing. The machine shop is fitted with a twenty-five-ton traveling crane which handles all car bodies, motors and other heavy parts. The inspection shop is fitted with floors between pits depressed approximately 18 in. to facilitate inspection. The trolley wires in the inspection shop have a feeder circuit, opened and closed through a magnet circuit breaker which has a remote control and is coupled with indicating lights and warning whistles so that the trolley cannot be energized unexpectedly. Such remote control switches have a spring release to prevent trolley wires being left energized without an attendant.

Changes in Equipment

No changes have been found necessary in the original design of the equipment or shops since its initial service in 1911. In 1921 a program of renewing armature windings in traction motors, air compressor motors and dynamotors was begun. This work is handled as the cars come in for overhauling and thus has extended considerably over two years. At the same time all field coils in these units were removed for the first time and for the purpose of renewing the exterior insulation and deteriorated leads.

During the rewinding of the traction armatures it was considered advisable to apply bronze end castings that would support the laminations not only below the coils but between the coils, and also to substitute a stronger air duct spacer in place of the old pressed steel type which has shown a tendency to fail. At the same time a solid conductor was installed in the traction motor armatures in place of the previous split bar overlap type conductor which has shown a tendency to fail before the insulation had run its life. These changes are expected to increase the life of the armature insulation materially.

Some consideration has been given the question of equipping motor cars with the modern type of line switch to assist contactors in handling the current. However, thus far failures due to the lack of these devices have not been of such a character as to seem to make them essential.

Sliding Contacts to Replace Rollers

The current collectors are the U.S. 121-A pantograph with built-up angle-iron frame and with rollers revolving in bearings as the contact device. The pantographs themselves have given no trouble and will continue to be used as originally designed. The rollers, however, which are 5 in. in diameter, are to be replaced with a sliding shoe contact. This decision was reached after extensive service tests in which the sliding shoes were found to require less maintenance and less tension in pantograph springs at the same time that they afforded a much larger contact area. Due to the two latter advantages of the sliding contact considerable savings are expected in the reduction of trolley wire wear.

J. C. McPherson is superintendent of the East Bay Electric Division of the Southern Pacific Railroad and J. H. Lockett is master mechanic.

Repeater Signals Aid Safety Car Operators

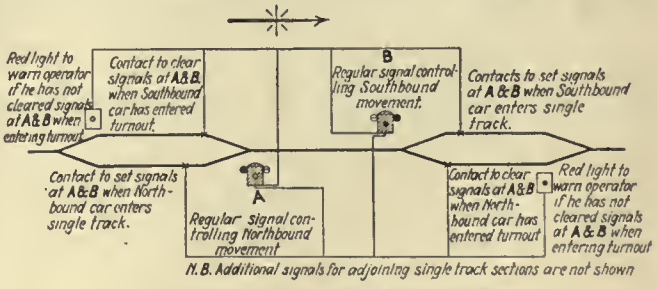
A SIGNAL that cannot be relied upon is worse than no signal at all, and on single-track electric railway lines the proper clearing of signals is second in importance only to their proper setting. If the indication remains "Stop" after a car has passed beyond the section of track which the signal is intended to protect, other cars may be held up unnecessarily. When this occurs very frequently the motormen lose confidence in the signals and sometimes proceed onto single track against a "Stop" indication, thinking only that the last car in the opposite direction failed to clear the signal. With two men on a car it is easy for one of them to watch the signal to see that it has been cleared after the car leaves the single track and enters a turnout. But with the increasing use of one-man cars throughout the country somewhat of a problem was created.



Repeater Signal Located on Pole at End of Turnout

Inasmuch as the signal which protects a car on single track against an opposing movement must be in front of the car on the siding, it will necessarily be behind the first car after the latter has reached the turnout. The operator of a one-man car, therefore, has no way of telling whether or not he has cleared the signal after leaving the single track unless he stops his car and looks back at the signal. If his car is crowded, or if low branches obscure the signal, he may even have to get out of his car to see it. Under these circumstances it is inevitable that an operator will often not take the trouble to make sure that he has cleared the signal.

The Public Service Railway of New Jersey met this situation in an unusual way, its lines being equipped with United States non-registering signals. Since with this system the first car to leave the block clears all the signals, the rules state that there shall be only one car at a time in the block, and the motorman may no more enter against the green light set by the preceding car in the same direction than he would enter against the red of an opposing movement. So long as two-man cars were operated on the single-track lines of this company it was the custom for the conductor to look back at the signal after a car had entered a turnout and give the motorman two bells to proceed when he saw that the signal had been properly cleared. In the summer of 1920, however, safety cars began to replace the



Position of Signal Lights and Contacts

former two-man cars on many of these lines, and trouble was experienced. To remedy the difficulty the company devised a repeater signal which would be visible to the operator on the front end of a safety car, and this device has now been installed on all lines where safety cars are operated on single track.

As an example of the way the scheme works, let it be assumed that a northbound car is entering a stretch of single track. The entrance of the car upon single track sets three signals. The first is the green signal at the point where the car left the siding. The second is a red "Stop" indication at the other end of the single track to halt an opposing movement. The third is the repeater signal, which is, like the second, at the distant siding, but some distance beyond the ordinary signal and facing toward the car which set it. When the northbound car has left the single track and entered the next turnout it passes under a contact which clears all the signals. The repeater signal shows simply a plain red light whenever the other signals are set for northbound traffic, and far enough ahead of the contact so that the operator can readily see it and know whether or not he has cleared the signals behind him. If not, the red light before him gives warning not to proceed until he has done so. This device has worked in a most satisfactory way on the Public Service Railway and has eliminated much signal trouble.

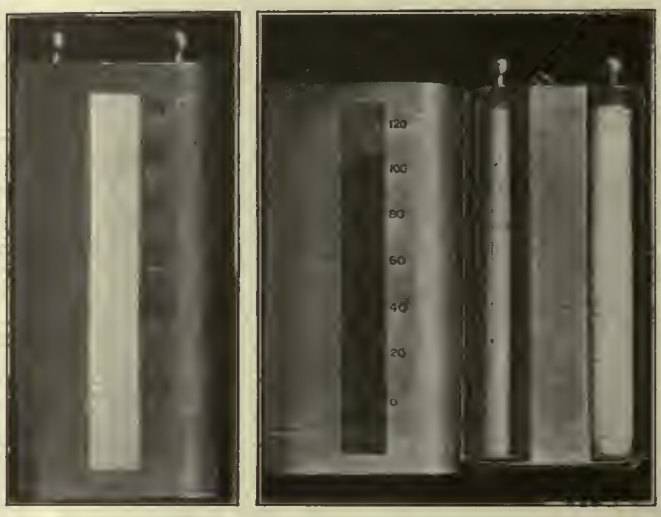
Detroit Traffic Graph Made Directly on Street

A Simple Mechanical Device Is Used by Which the Checker Records the Car Loading by Drawing a Line Along a Straight Edge

TO SAVE office labor and secure immediate interpretation of car-loading and headway checks taken on the street, the Department of Street Railways, city of Detroit, has devised the following means for recording and plotting the car-loading graph in one operation:

A strip of paper about 64 in. long by 7½ in. wide is prepared as a record form by unbroken horizontal rules to cover passenger capacity and by short vertical rules top and bottom to cover the time intervals. The numbers of the cars corresponding to the time points are written in together with the name of the route and intersection. The length of the record portion itself is 54 in., the remaining length being required for a 5-in. ear at each end, which is cut out for the easy rolling up of the strip on a spool, as described in the next paragraph. One ear carries the necessary identification marks as shown in the illustration below.

To secure the synchronous loading check and graph, the strip is placed in an elliptical or flask-shaped container made of sheet copper and measuring 8½ in. in height, 4½ in. in width and 1¾ in. in depth. Within the container is mounted a sliding base into which are set two spools slotted exactly like the film spools of a kodak. All that the checker has to do in loading the container is to roll up the strip on one of the spools and attach the ear to the slot of the other spool. The spool-base is then pushed back into the container, into which an opening has been cut to expose 1 in. of strip.

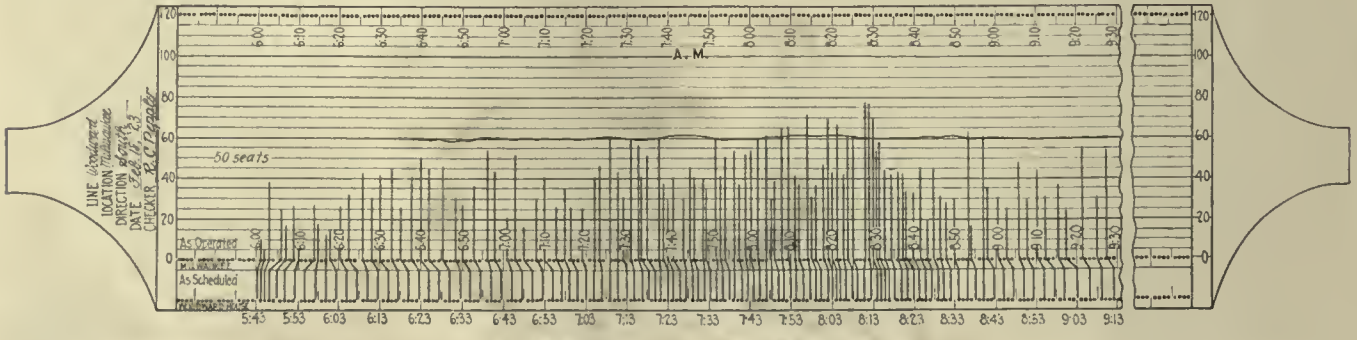


At Left, Recording Device Used in Detroit in Changing Car Loadings. At Right, the Spool Carrier, Which Embodies the Principle Used in Hand Cameras

As each successive car arrives, the checker winds up the strip by means of the spool knob and draws a "time-load" line along the straight edge on the right-hand side of the container window. The length of this line, of course, is proportionate to the passenger load. The checker is guided in drawing this line by the passenger-load scale (0-20-40-60-80-100-120) stamped alongside the container window.

Coal Investigation by A.E.C.

AT THE last meeting of the executive board of the American Engineering Council, held in Cincinnati, March 23-24, it was decided to make a nation-wide investigation on the economic value of coal storage. It is understood that both the Coal Commission and the Department of Commerce will look with favor upon such a survey. The object is "to determine the facts relating to the engineering, chemical and economic factors involved in, and their influence upon, coal storage at the mine and by large and other consumers of coal." It is expected that President Cooley will appoint a committee representative of the various groups interested, such as mining, transportation, public utilities, chemical engineering, etc.



Part of Record Strip with Car Loading Graph

Way Construction Experience in Portland

Rail Direct on Concrete Slab Has Given Best Life—Ballasted Track Has Proved Unsatisfactory—All Track Now Being Laid with Concrete Slab to Eliminate Settlement—The Details of the Construction Are Given

By F. I. Fuller

Vice-President Portland Railway Light & Power Company, Portland, Ore.

THE Portland Railway, Light & Power Company's track system consists of a total single track equivalent of 297.6 miles, 150.8 miles being paved and 35.4 miles unpaved in the city streets of Portland. On the interurban lines there are 2.78 miles of paved and 108.6 miles of open track. Of the above track 186.2 miles in Portland is 3 ft. 6½ in. gage and the balance is standard gage.

Ballasted Track Construction Not Satisfactory in Portland

In the business district the track is principally from fifteen to twenty years old, laid mostly with a 7-in. grooved rail. Some is on ballasted tie construction and some on a concrete slab, and nearly all is paved with basalt stone blocks. The most satisfactory of this old type construction has been that in which the rail was laid directly on a concrete slab with small ties about 10 ft. apart and tie rods in between.

Joints are cast welded and, while some of these joints failed due to softening of the rail head over the weld, a large proportion are still good. (See Fig. 1.)

The tracks in the residential portion of the city are laid principally with 6-in., 72-lb. tee-rail on the narrow-gage lines and 7-in., 80-lb. tee on the standard-gage lines. Ballast is either bank gravel or broken stone, drained with a 4-in. farm tile under the center of the track and connected to the street sewer at all available points. Paving is either stone, brick or concrete. Joints are 4-bolt continuous type and the rail is fastened to the ties with ordinary track spikes.

This type of construction has not been entirely satisfactory as, due to the wet climatic conditions of Portland, the track shows a tendency to settle, causing the pavement to break up along the rails. The continuous joints have become loose and it is very expensive to rebolt them where the track is paved. The track spike does not hold the rail firmly to the ties, allowing the rail to move vertically as the cars pass. Track of this type, while lower in first cost, does not last as long as the more rigid construction. (See Fig. 2.) In a climate like ours, with comparatively long and wet winters, any ballast with voids in it, placed on a clay subsoil, no matter how well drained, will not be satisfactory in hard-surface paved streets.

Our latest type of construction for tracks in the business district is with 7-in., 105-lb. grooved rail for the narrow-gage tracks and 7-in., 122-lb. grooved rail for the standard gage tracks. Concrete slab foundation 6 in. to 8 in. thick and surfaced 2 in. below ties is used. A farm-tile sub-drain under the concrete slab is connected to the city sewer wherever possible. The ties are 6 ft. long for the narrow gage and 8 ft. long for standard gage, spaced on 3-ft. centers and tamped up with 2 in. of 1-in. rock on top of the concrete slab. After the track is surfaced this fine rock is grouted. The rail is fastened to ties with 8-in. x 10-in. x ½-in. flat tie plates and 6-in. screw spikes. The rail is also held down to the concrete between ties with ½-in. x 1-in. steel stirrups bent over base of rail and extending down into the concrete about 6 in. Joints are standard 4-hole

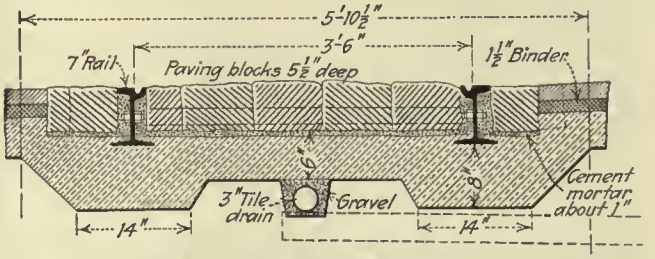


Fig. 1—Construction Installed on Washington Street, Portland, in 1892, and Still in Service

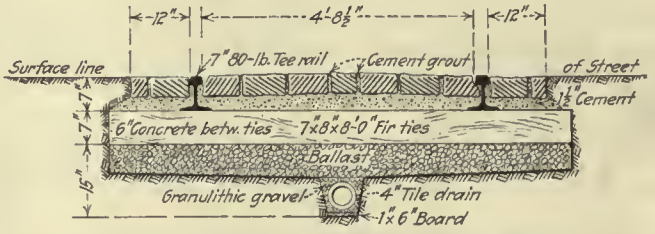


Fig. 2—Type of Track Used Generally in Portland During Past Fifteen Years

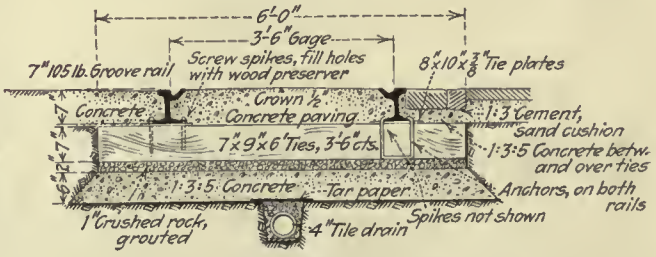


Fig. 3—The 1923 Track Construction in Portland, Employing Tie Plates, Screw Spikes and Anchor Stirrups

fish plates, electrically welded to the rail top and bottom, and the heads and nuts of the bolts are also welded to the plates. Paving is either basalt stone blocks or concrete on a concrete base between ties. Cast-iron surface drains the full width of the track are placed at all low points in grades. (Fig. 3.)

Our new type of construction for tracks in the residential districts is similar to the new type in business districts, except that 6-in., 100-lb., A.R.A. tee-rail is used and the paving is all concrete.

We expect, with these new types of construction, to eliminate practically all track settlement and vertical movement of the rail, thereby prolonging the life of the

track and keeping the surface of the street in better condition.

All special trackwork pieces are made to standard dimensions. The narrow-gage curves have a center radius of 35 ft. with 75-ft. radius switches. Our standard-gage curves have a 57-ft. radius with 120-ft. radius switches. Nearly all special trackwork is built in our own shops. The switches are all of one-piece cast-steel design, the mates, frogs and crossings of grooved guard rail being electrically welded with heavy base plates, knees, riser plates for flange bearings, etc. Steam-railroad crossings are either solid manganese, purchased from special trackwork manufacturers, or of the bolted rail type, made in our own shops.



A Graceful Steel Bridge on the P. R., L. & P. Co.'s Lines

SPECIAL TRACKWORK IN PORTLAND LARGELY HOME MADE

Spring or lock boxes made in our own shops are placed on all switches to hold the tongues in the desired position.

Three stationary shop electric welders and five portable welders are kept constantly busy on the manufacture and repair of special trackwork. All rail cutting necessary for the making of special trackwork is done with gas cutting torches.

Cast steel switches and the electric welded special work are proving very satisfactory from the standpoint of first cost, quickness of manufacture and length of service. Open tracks on these lines have rail weighing from 56 lb. to 80 lb., on 7-in. x 9-in. x 8-ft. wood ties laid on gravel ballast. Spring switches and frogs are used, and the rail joints are partly of the 4-hole continuous type and partly angle bars. Bonds are principally No. 0000 electric welded type.

During 1922 we extended our Cazadero line 5 miles to the north fork of the Clackamas River and this year a further extension of about 24 miles is being made in order to reach a new hydro-electric power plant being built by the company. These extensions are through a mountainous country and the grading work was all very heavy.

Two of our largest bridges on the interurban lines were reconstructed last year. The Sandy River bridge, which is 1,700 ft. long and 80 ft. high, was rebuilt with steel truss construction for 280 ft. and six post frame bents on concrete piers for the balance. About 865,000 ft. of timber and 278 tons of structural steel were used in this work.

The other bridge replaced was a 170-ft. wooden deck truss bridge across the Clackamas River at Faraday. This was replaced with a 190-ft. steel arch span. The deck is over 100 ft. above the river. As this was a difficult place in which to build falsework, the old wooden bridge was first stripped, the ends and decking were removed and the bridge was then lowered 20 ft., moved lengthwise 9 ft., and used as falsework during the erection of the new steel work.



Old Wood Bridge Used as Falsework for New Steel One

Los Angeles Board for Extensions, Subways and Buses

Ten Miles of Double Track on Sixteen Car Lines and Installation of Twenty-four Feeder Bus Lines Planned at a Total Cost of $5,000,000—Subways Favored for Congested District—Unification of System Suggested

THE Board of Public Utilities of Los Angeles, Calif., which for the past eight months has made an extensive study of the local traffic congestion and transportation problem, on March 20 presented its report, which was signed for the board by Walter R. Leeds, president; Commissioners J. P. Kennedy and E. F. Bogardus and Chief Engineer F. A. Lorentz.

The principal recommendations are that the two local systems, the Los Angeles Railway and the Pacific Electric Railway, construct 10 miles of double-track extensions to sixteen different street railway routes into unserved portions of the city and install twenty-four motor-bus feeder lines, totaling approximately 82 miles.

It is recommended that the Los Angeles Railway's lines be extended into Hollywood, which now is served exclusively by the local lines of the Pacific Electric system. It is proposed that certain Pacific Electric track in Hollywood, which is standard gage, be equipped with a third rail for use of the Los Angeles Railway's narrow-gage cars. Certain changes in routing and service are also included.

The report calls for immediate construction by the Pacific Electric of a subway from its Hill Street terminal to Glendale Boulevard, and claims that it is necessary that the same company's line be extended along Highland Avenue to connect with its Sixteenth Street line at Vineyard Junction.

The program for improved street car service in Los Angeles will cost approximately $4,000,000. The railway extensions recommended will cost about $170,000 per mile of double-track girder-rail construction in paved streets, or a total of $1,700,000. It is estimated that the companies will be obliged to purchase at least fifty motor buses, costing from $6,000 to $8,000 each, and employ 2,000 additional men.

The report favors universal free transfers at all points of contact, both between rail lines and bus lines, irrespective of ownership. It is recommended that the "gentlemen's agreement" between the two railways, under which neither will make extensions into the other's territory, be broken. In lieu thereof there should be a harmonius understanding between the two companies which will permit each to render the service that the city requires. Unification of the systems is favored, but the board takes the stand that this feature and the question of universal transfers rest with the State Railroad Commission along with its powers for fixing rates of fare.

The board's report, however, is opposed to the increased street car fares granted the Pacific Electric lines Jan. 1, 1922, by the Railroad Commission, which are characterized as contrary to the charter privileges of the city of Los Angeles. Under the commission's order, claims the board, this company is permitted to receive more for transporting local passengers in the city than is the Los Angeles Railway.

Commenting on the bus situation, the report states:

> The use of motor buses as auxiliaries to our existing street car service is a foregone conclusion. The vast cost of maintenance of the rail lines, including the upkeep of tracks, paving rights-of-way, erection of substations for the generation of power and the high cost of same, to which is added a very large sum in the form of depreciation, are all factors that will occasion the installation of bus-line service. Such service will greatly assist in solving our transportation problems, and if sufficiently operated will prove to be the most important adjunct to our present rail system.
>
> It is estimated that 4½ cents of each 5-cent fare that is taken in is expended in the manner stated above. Moreover, street cars move slowly and they deposit passengers in the line of traffic, while buses receive and discharge passengers at the curb. The bus is a utility within itself. It generates its own power, is flexible, accommodates as many people as the street car, moves more quickly and in every way is more adapted to the needs of the traveling public. Less than half of each bus fare is consumed in the maintenance of the system, hence a greater profit and better service.

The board states that it will take no action on the application of the People's Motor Bus Company, represented by William G. McAdoo, for a bus line franchise, since the question is to be voted on at the election May 1. The McAdoo bus interests have circulated an initiative petition, which is to go on the ballot, to repeal the present jitney ordinance prohibiting operation of buses on the congested streets. Another petition to be voted on is whether the People's Motor Bus Company shall be granted a franchise for motor bus lines on 62 miles of the city's streets.

Extensive Transportation Demands Outlined

The report also contains a memorandum dealing with the extensive transportation demands outlined by the board, which are claimed essential in solving the transportation problem. The subway problem was not gone into, however, but it was announced that the board's chief engineer soon will submit a detailed report on this subject. It is understood that subways are favored for urban and interurban traffic, costing in excess of $75,000,000. This is far more elaborate than the proposal of the Los Angeles Planning Commission submitted to the board several weeks ago. This latter plan was for a system of subways to remove the Pacific Electric's interurban trains from the congested streets.

Upon serving the two street railway companies with notice to place the proposed program in effect, the board gave them ten days in which to file replies, following which the board will formulate its recommendations to the City Council for enforcement.

President Leeds, commenting on the report, stated that he favors that part of the report coming under the memorandum, but does not approve the recommendations concerning the buses, saying in part:

> I do not approve what is said in the report about motor buses. Experience of approximately fifty cities of the United States for the past few years has shown the following conclusions in regard to motor-bus operation: (a) Motor buses as substitutes for street cars in heavy traffic areas are not satisfactory; (b) motor buses competing with street cars generally result in inferior service on the car

lines with increased fare, which causes public reaction against such competition; (c) motor buses, where operated as feeders by rail carriers in new territory not yet able to support street car service, are found to be satisfactory, and (d) motor buses are most economical where traffic is comparatively light.

In his comments President Leeds stated that while universal transfers are desirable, unless provision is made to charge for them their use will result in increased fares. He stated further that he did not believe the Board of Public Utilities should be made the catspaw to force upon the street railways and the public the extension of rail lines or the operation of bus feeders to help the promotion of new real estate subdivisions.

Following its report the Board of Public Utilities has announced tentatively the plans it proposes to recommend to the City Council for rapid transit for both urban and interurban traffic, which involve an elaborate subway and elevated system. Two distinct subway systems are called for, the first to be a "Y" system, with Pershing Square as its center, while the second forms a loop around the downtown congested district, the two systems to connect at three or more points. Both of the subway systems, as well as the elevated system, are to be arranged for four-track operation.

The plans call for bringing the interurban trains of the Pacific Electric system between Los Angeles, Hollywood, Glendale, San Fernando Valley points and other northwestern points into Pershing Square from the north by the northwestern arm of the "Y," while the Pacific Electric lines between Los Angeles and Santa Monica Bay points are to be routed over the southwestern arm of the subway.

The Pershing Square underground depot, as provided in the plans of the Los Angeles Planning Commission, also would be a dispatching point for Pacific Electric interurban trains to the southeast and northeast under the board's plans.

The board proposes that the Pershing Square "Y" subway should also be used by the local street car lines as well as by the interurbans, which, entering the city over various routes, will be afforded opportunities for transfer. Pacific Electric trains that now operate from the Sixth and Main Streets terminal, Los Angeles, for northern division and southern division points under the board's plan would operate from the Pershing Square depot through the proposed tube to the Main Street terminal, thence via viaduct to the interurban right-of-way.

It is expected that the subway and elevated plans of the Board of Public Utilities will be officially placed before the Pacific Electric and Los Angeles Railway companies when the survey now under way, contemplating the unification of the two local street car systems in Los Angeles, is completed.

Installation of six viaducts across the Los Angeles River, estimated to cost $3,801,281, have also been recommended by the board, the viaducts to be constructed at Macy, Aliso, First, Fourth, Seventh and Ninth Streets. In addition the board recommends the depression of the tracks on both banks of the river, a program bringing the total estimated cost of the project to $5,001,281. These proposed viaducts are to relieve traffic congestion and eliminate grade crossings, carrying city, county, street railway and steam road traffic. The board recommends that in carrying out this "short viaduct" plan the city, county and street railway lines should each bear 16⅔ per cent of the total cost, while the two steam roads involved would pay the remaining 50 per cent. The board claims that the "short viaduct" plan is the most favorable because the steam roads are now located on the east and west banks of the river through the industrial district.

Buffet-Parlor Car Has Novel Interior

A NEW buffet-parlor car was put in service by the Chicago, Aurora & Elgin Railroad the latter part of March. This car has been under construction for the last six months at the company's Wheaton shops. It is the first of three similar cars. The two remaining cars will be ready for service about the first of June.

Approximately $30,000 was spent in building and equipping the new parlor-buffet car. The design embodies the latest features of high-speed equipment, the underframe being of solid steel, heavily reinforced with a steel superstructure to insure rigidity and easy riding qualities. The car is driven by four 125-hp. motors, capable of speed up to 70 m.p.h.



The Tables in the Dining Compartment May Be Removed, Converting It Into a Parlor Car

It is stated that no expense has been spared in providing interior comfort, and that the car will be one of the finest examples of buffet equipment on any suburban road in the country. Richard A. Boaler of Watson & Walton, Chicago, designed the interior decorations, which provide a light, cheerful atmosphere.

The floor of the lounge smoking compartment is finished in marble effect with green, tan and black predominating, with the main or dining compartment in tan and black striped Wilton carpet. The body color and walls resemble old Grecian marble, striped in Athens green, gold and black, these bright tones being set off by a black wainscot carried up to sill height. The furnishings are luxurious reed chairs, painted and glazed in red to match the decorations.

Electric heaters, thermostatically controlled, heat the car, and Pullman semi-indirect lighting is used. Ventilation is secured by Utility ventilators. The chef's kitchen has been given special attention to secure perfect sanitation, with adequate facilities for icing perishable foods. Individual dining tables fold into compact compartments when not in use. The car exterior is painted vermillion. A new step, designed after experimentation, makes alighting at either elevated platform or street level easy for women.



Fire-Fighting Towers in Operation

Latest Practices Followed in New St. Louis Carhouse and Storage Yard

Plant Constructed for Handling Light Maintenance and Inspection Work of 125 Cars Consists of Office Building, Shop, Washhouse and Large Storage Yard—Cost Was $265,000

AN EXAMPLE of modern practice in carhouse and storage yard design is the new division layout of the United Railways of St. Louis, located at Broadway and Taylor Avenue. This plant, exclusive of the land, cost about $265,000. It consists of a two-story office building, a shop building, a washhouse and several smaller buildings, together with a storage yard having track facilities for more than 200 cars. The office building, which measures 62 ft. x 70 ft., furnishes accommodations for the divisional headquarters. In addition to the offices, it is provided with recreation rooms, shower baths, steel lockers and a rest room for the convenience of the employees. The inspection shop, which is the largest of the group of buildings, measures 81 ft. x 200 ft. The structure designed to be used exclusively for car washing has dimensions of 53 ft. x 125 ft. Sufficient space is available so that the present car storage capacity of 200 cars can be later increased to 400 by the addition of more tracks. Both the building and the yards are equipped with modern fire-protection devices, the yard protection consisting of nozzle towers so spaced that any part of the yard can be reached with a stream of water.

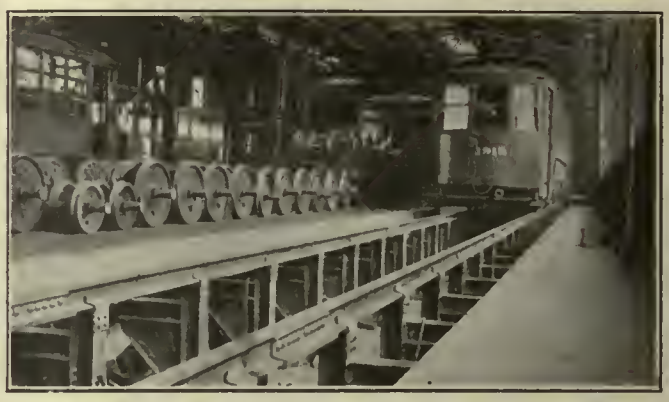
The washhouse and shops are laid out in a line, with a transfer table between them, so that cars can be brought in at one end of the washhouse and, after



Division Buildings and Storage Tracks



Washroom, Showing Hot Air Ducts



Track with Special Construction to Facilitate Inspection Work

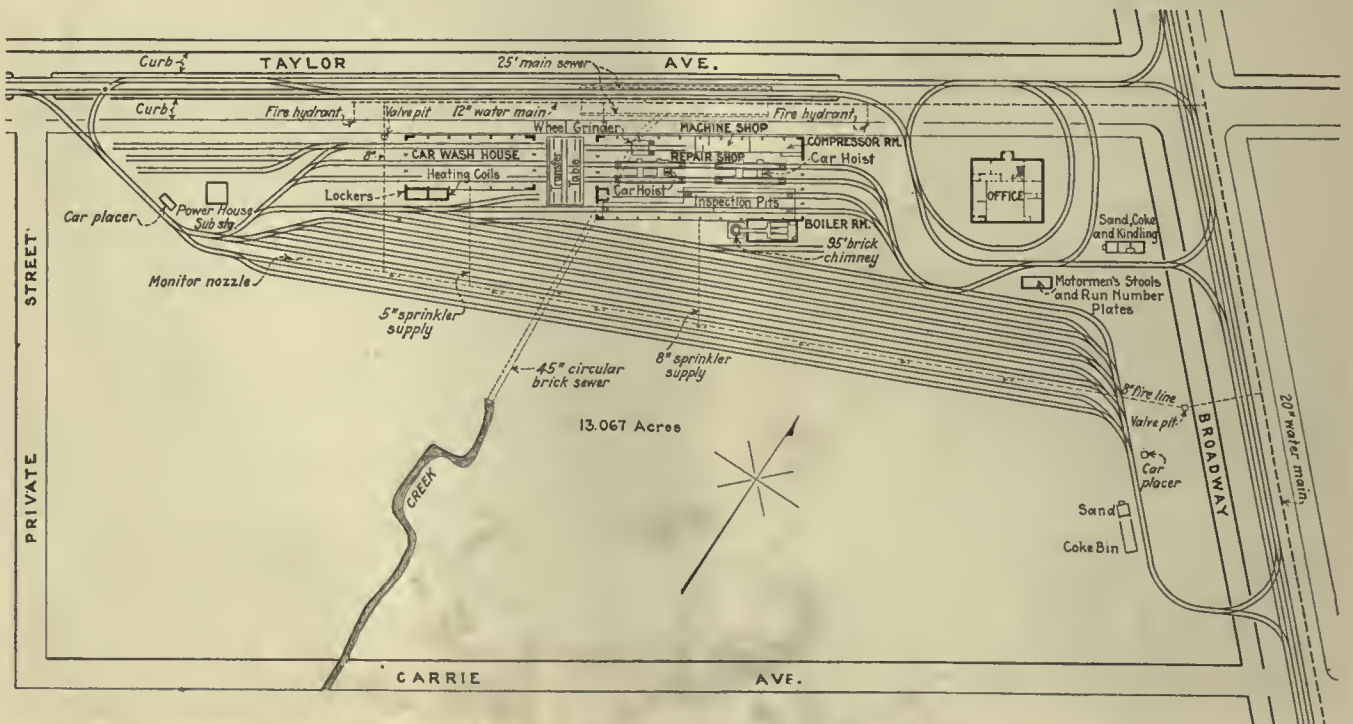
washing, moved out the other end onto the transfer table, from which they can be set on any track in the shop. On completion of the shop inspection the car is run out the front end and switched into the storage yard. Both shop and washhouse are of brick and steel construction, each having full glass sides from a height of about 4 ft. In this way excellent advantage is taken of the natural light. Both buildings are fitted with Kinnear rolling steel doors at each end.

An interesting feature of the washhouse is the method of hot air heating, the air being distributed throughout the building by means of a system of overhead ducts. The outlets of these ducts are curved, as can be noticed in one of the accompanying illustrations, so that the air blast is directed against the side of the car. This scheme has been found particularly helpful in drying the windows after washing, so that no streaks are left. Moreover, this positive system of heating has proved very efficient in heating the whole building to the proper temperature, and but a few minutes is required after the blower is started to establish the required degree of heat.

The same method of heating has also been installed in the shops. The steam for both heaters is furnished from a small boiler plant adjacent to the shop. In the shops the radiator and blower equipment is located on a specially constructed overhead platform so that no otherwise useful space is taken.

Besides the desirable arrangement of tracks for moving cars into and out of the shops, one shop track has been specially designed to facilitate car inspection work This track has a pit open on the sides as well as between the rails, and the floor adjacent to it is about 8 in. lower than the track level. With this construction it is convenient for men to sit on the floor while inspecting journals, etc. The floor being cut back in this manner allows an open, well-lighted space for storing a few brake shoes, gear cases and other parts used on ordinary maintenance work. The depth of this inspection pit is 4 ft. 6 in., while the pit under track where motors are removed is 5 ft. deep.

One corner of the shop is partitioned off to serve as an air compressor room, for the air storage system for brakes is still used in St. Louis. Having an abundance of air available, air hoists are located at convenient points about the shop. The other equipment used in the light maintenance and inspection work of some 125 cars of that division consists of a pit wheel grinder and two pit motor hoists. Machine shop tools comprise a small lathe, a drill press, a commutator slotter and a forge.



General Plan of Site of New Carhouse, with Building and Track Layout

Company Employee Organizations on Eastern Interurban

Both a Twenty-Year Club and an Employees' Association Organized Among Interurban Men—Employees' Organization Functions Wholly from Membership

THE employees of the Olean, Bradford & Salamanca Railway, Olean, N. Y., are organized at the present time into two associations, namely, the Twenty-Year Club and the Olean, Bradford & Salamanca Railway Employees' Association. The Twenty-Year Club members are all members of the employees' association and attend both the meetings of the association and their own club meetings.

The Olean, Bradford & Salamanca Railway succeeded the Western New York & Pennsylvania Traction Company after foreclosure sale in October, 1921. A potent factor leading up to the receivership of the Western New York & Pennsylvania Traction Company was a strike of the employees in 1919, at which time demands were made for a minimum wage; recognition of the union just organized, and improved working conditions, especially in the operating department. This strike, fought by the railway, ultimately resulted in a truce whereby the men returned to work upon the promise that a tentative agreement would be shaped into a definite agreement immediately. A committee of the men met the management and an increased wage was allowed, the union was not recognized and working conditions were considerably improved. The agreements signed by the men ran one year and expired. Meanwhile a receiver was appointed. He increased the wages of the men and matters remained in statu quo.

The bondholders purchased the property and after reorganization appointed R. H. Wheeler general manager. Mr. Wheeler took over his duties on Oct. 1, 1921, after having spent some time as manager for the receiver, during which he had become conversant with the situation with regard to the attitude of the men to the company. At that time the men were literally adrift and were fertile ground for another union organizing campaign.

Twenty-Year Club

Just before the new year of 1921, those men who had been in the employ of the road twenty years or more were invited to an informal dinner by the manager. He pointed out the relationship he desired to establish between the men and his office, stating frankly his views that the railway was in dire straits as to a sound financial future and that the very friendly and cordial assistance of the men to carry out the plans of a manager was perhaps the first essential toward rebuilding the road. As the manager was a total stranger to the men, he desired to build up an interchange of friendship and daily strengthen their confidence in his plans by a more or less intimate knowledge of the program to be carried out, gaining this knowledge by discussing the problems as they arose, in so far as the men could help him by a free interchange of thought in open meeting.

The men readily appreciated the frankness of the manager's position and responded quickly in the formation of the Twenty-Year Club, which to date comprises about twenty-five members. A constitution and by-laws were drawn up; neat coat lapel emblems were presented to the men by the management, and a meeting room engaged without expense to the men where meetings are held on the first Tuesday of each month. These men as seniors in the various departments of the road very readily gave of their experience and knowledge of the past affairs and became immediately an invaluable store of information to the manager in picking up the threads of local administration in the cities of Olean, N. Y.; Bradford, Pa., and Salamanca, N. Y.

Officers of the company in the employ the requisite number of years ranked shoulder to shoulder with trackmen and men in the operating department. The first president of the Twenty-Year Club was Floyd A. Garey, an experienced and capable motorman in the freight locomotive service.

On one or two occasions, the management has provided an evening of instructive entertainment through educational films or the introduction of speakers upon subjects non-technical but of interest. When the reasons were explained, local merchants readily gave of their time and thought to the Twenty-Year Club, talking informally upon interesting subjects. This also served to acquaint and interest the patrons of the road with the plans of the new management. Meetings are held in one or another of the three cities, rotating upon invitation. Spontaneously, the matter of a ladies' night came up, the idea being that the ladies, wives of the members of the club, should be permitted to participate. Since its organization, the club has enjoyed two or three ladies' nights, with the ladies as guests at an informal dinner and the members and their wives treated to a theater party by the resident members.

The Twenty-Year Club functions, as it was conceived by the manager, with increasing interest arising from within the ranks of the members and the monthly meeting is an event to which all look forward, days in advance. On the other hand, the Twenty-Year Club has been of inestimable assistance to the manager, as the employees of the road soon saw the sincerity of the relationship developed and became anxious to enjoy the same cordial understanding with the management as do the club men.

Employees' Association

In April, 1922, the Twenty-Year Club requested the employees of all ranks and departments to meet with them to form an Employees' Association. The response was so cordial that it was decided to hold the meeting after the usual operating hours of the railway and more than 95 per cent of the employees of the road were in attendance at the meeting and signed the Articles of Association.

When Mr. Wheeler came to the property, he early sensed the fact that the men lacked some form of association among themselves to build up the *esprit de corps* of the property. He felt certain that if a demonstration could be made of a sincere interest upon the part of the manager in problems of the men and an open mind as to their viewpoints, co-operation would result and a feeling be built up on the part of the men that their problems could be worked out at home without the necessity of calling in any organization to negotiate for them.

This was founded on the belief that no results achieved could be sound and durable unless both sides were convinced of the frankness of the negotiations. When 95 per cent of the men met at 12:30 midnight at their personal discomfiture to form an employees' association, it was at once apparent that the men were con-

vinced that a new epoch in management had successfully been launched and they were ready immediately to co-operate in its continuance.

As in the instance of the Twenty-Year Club, a constitution and by-laws were drawn up and officers elected, the first president being John A. Nutt, chief electrician of the property. As a little surprise to the men, at this meeting, the manager stated that he had been able to negotiate with the Travelers Insurance Company a group insurance whereby each man in the association could enjoy $500 of life insurance and $500 of accident and disability insurance, making a total of $1,000, in case of death from unnatural causes, or $500 in case of death from natural causes. In this matter, the company undertook a small percentage of the payment of the premium in accordance with the laws of the state of New York. The remainder of the insurance is paid by the men from dues in the association.

Health and disability insurance is handled by the recommendation of the insurance committee to the executive committee of the association. There is available a certain proportion of the dues set aside monthly and invested, which, at the discretion of the executive committee, can be donated to needy members in the form of a lump sum payment or a weekly indemnity. This method of handling the health insurance results in an individual inspection of each needy case and brings to the attention of the whole association any of its members in outlying points who are out of the service because of the misfortune of illness, either individually or in their families. Under this arrangement less than 10 per cent of the fund has been distributed, whereas, by other methods of handling the fund, it would have been possible to dissipate the fund because of trivial demands upon it.

An emblem was decided upon, and, with each certificate of membership and insurance policy, this emblem was distributed by the association to its members. The association has met by invitation in the cities served by the company. There has developed a considerable spirit of rivalry between teams of the association's athletic activities in the various cities. Whenever a meeting is held away from the Olean headquarters, there is always a desire to witness the events which transpire during the evening, bringing out a large attendance. The railway in each case is very pleased to furnish special car service as there are always employees available to operate the equipment.

One of the standing committees of the Employees' Association is a company relations committee. This committee has met the management in only one instance in the past sixteen months and then for an informal discussion of a new ruling promulgated relative to labor passes, in order to determine more accurately the individual application of the pass ruling. When the committee left the discussion, each member pledged himself as in exact accord with the ideas of the management and agreed to constitute himself a committee of one to disseminate the discussion among the ranks of the employees. In consequence the matter was never again questioned on the road. This incident proved the success of the theory of having a committee handle the matters with the employees after they have become convinced of the intention and spirit of the ruling.

In no instance where discipline has been necessary has there been any request for a revision of the decision upon the part of the company relations committee, and to the knowledge of the management the company relations committee has never been approached to request a hearing.

These employee organizations function wholly from their membership. The working of the new arrangement shows the men to be in complete accord with the policies and plans of a management which is appreciative of the efforts of the "human" spokes which maintain the integrity of the wheel and make it easy to keep rolling.

The sincerity of the men and the management under the new arrangement has won the liberal support of the business men, who in turn have helped in their way to raise the standing of the electric railway men to a new status in their communities.

Average Automobile Carries Less than Two Passengers

THE Pacific Railway Advertising Company recently conducted an investigation to determine the average use of passenger automobiles and street cars. On Saturday, Nov. 4, 1922, investigators at principal street intersections in the cities of Seattle, Portland, San Francisco, Oakland and Los Angeles checked 4,101 automobiles carrying a total of 6,730 passengers. This is but 1.64 passengers per automobile. The street cars carried 700 revenue passengers a day on the average. Ten street cars would, therefore, transport 7,000 people a day, which is more than is carried by 4,101 automobiles with the average load.

With the exception of Portland, Ore., more than half the automobiles checked carried the driver only. In Portland and Los Angeles approximately 80 per cent carried but two persons, while in San Francisco, Oakland and Seattle approximately 90 per cent of the automobiles carried two people. The figures of the investigation follow:

	San Francisco		Oakland		Los Angeles		Seattle		Portland	
	No.	Per Cent	No.	Per Cent	No.	Per Cent	No.	Per Cent	No.	Per Cent
Driver only....	1,102	64.0	241	57.0	586	52.0	259	54.0	136	37.0
Driver and 1 passenger...	453	27.0	143	34.0	308	28.0	170	35.0	161	43.5
2 passengers.	89	5.0	25	5.5	133	12.0	37	7.7	43	12.0
3 passengers.	34	2.0	11	3.0	57	5.0	10	2.1	23	6.0
4 passengers.	14	0.8	2	0.5	35	3.0	1	0.2	5	1.0
5 passengers.	*16	0.9	...	....	....	....	...	....	2	0.5
6 passengers.	*5	0.3	...	....	....	....	...	....	...	....
	1,713	100.0	422	100.0	1,119	100.0	477	100.0	370	100.0
Passengers....	2,612		656		1,994		755		713	
Average people per car.....	1.52		1.55		1.78		1.58		1.92	

* Jitney buses included. Delivery trucks not included.

The investigation also developed that only 50 per cent of the owners of pleasure automobiles use them daily for business purposes. Only 18 per cent of the women of the family use them for shopping purposes, while 39 per cent of the men owning pleasure automobiles use the street cars twice a day going back and forth between their homes and their offices, and 13 per cent use the street cars most of the time. Of the women owning automobiles, 51 per cent use the street cars from three times a week to as often as twice a day.

The principal reasons advanced by automobile owners, both men and women, for their extensive use of street car transportation are that they find the street cars more economical, and that they are assured of safety from reckless drivers and speeders. Many of them stated that parking spaces were too difficult to find in the downtown section of the city, and the street cars were more convenient for shopping.

Additional Light on the Detroit Municipal System

Consultant's Leaflets Criticise Handling of Accident Cases and Purchasing by Established City Departments — Financial Methods for Amortizing Purchase Price Compared with Glasgow and Toronto — Renewal Fund Held Necessary Only on New Construction and Equipment

THE fifth, sixth and seventh bulletins prepared by Walter Jackson, consultant, for enlightening the public of Detroit, and which complete the series prepared by him, are now available. Other bulletins in this series have been abstracted in the ELECTRIC RAILWAY JOURNAL for March 3, 1923, page 371, and March 24, 1923, page 508.

The fifth bulletin in the series treats of the claims division. Mr. Jackson states that the claim department of the Municipal Railway System embodies the usual organization except that the trial attorneys are a part of the office of the corporation counsel. He states that this is apparently a disadvantageous difference. On the other hand, he states, the claim department has taken over two functions that hitherto have been part of personnel work of the transportation department. These are responsibility for the physical standard of applicants for platform jobs, and attention to certain personal features in the home life of the platform men.

Mr. Jackson states: "The claim department, although held responsible for the sums spent to compensate claimants for damages, suffers a serious disadvantage of having no direct control over the counsel who represent its side of the case in court. According to the present interpretation of the charter provisions, such legal work is to be done through the office of the corporation counsel, who, nevertheless, charges the cost of such services to the Department of Street Railways." The consultant quotes several sections from the street railway amendments to the charter, adopted in 1920, and says that to him these clauses mean that the electric railway management should have sole and immediate control over these expenditures for claims; or at the very least, the department should have the right to designate such individual counsel in the office of the corporation counsel as it considers most capable of conducting its litigation. He states that the present method is bound to involve much unnecessary labor and duplication of effort.

AUTOMOBILES CAUSE MAJORITY OF ACCIDENTS

Mr. Jackson then discusses the causes of accidents, giving several tables for accidents from September, 1922, to January, 1923, inclusive. These figures are collected in the accompanying table:

CLASSIFICATION OF ACCIDENTS BY MONTHS

Month	Total Accidents	Automobile Collisions	Car Collisions	Step Accidents	Passengers Carried
1922 September...	1,819	1,240	78	107	35,770,063
1922 October.....	1,890	1,329	92	103	37,752,445
1922 November...	1,900	1,384	99	102	37,103,301
1922 December....	2,499	1,805	197	126	38,258,194
1923 January.....	2,636	1,864	182	133	40,196,401

Commenting on the record, Mr. Jackson says: "No wonder that the claim department has taken the offensive and is suing automobile owners for damages to street cars! The department is permitted to sue directly in the justice court. Since May 15, 1922, the day of taking over the Detroit United System, about $3,000 has been collected amicably without suit. Should citizens sit on juries in which automobile collision accidents are involved—not unlikely when 70.7 per cent of all January accidents were due to automobiles—they can reflect on the fact that it is not customary for the trolley to careen out of its trackway to strike an auto; and that the driver of the street car is entitled to the benefit of the doubt because he was not allowed to run a car until he had passed a series of physical and intelligence tests. Furthermore, the apparatus of a street car, as regards stopping and starting, is not only the simplest known but is also subject to regular inspection—something that cannot be said of the individually owned car."

Mr. Jackson says that in the extremely hazardous month of January there were 61.6 accidents per 100,000 car-miles and 6.59 accidents per 100,000 revenue passengers.

OVER 3 PER CENT OF GROSS PUT IN ACCIDENT RESERVE

Regarding reserve funds for accidents, Mr. Jackson states that the Department of Street Railways has continued the practice of the Detroit United Railway of setting aside 3 per cent of the gross earnings as an accident reserve, aside from the cost of conducting the claim department. He gives figures showing that for the months of July to December, 1922, inclusive, the department has set aside 3.3 to 3.6 per cent of the gross for this purpose. Payments from the fund have been materially less than the amount reserved, since old cases under the Detroit United régime are not included in the statement, and claims so far have been made in less than one-fifth of the accident cases, while it is estimated that in 1921 the D.U.R. had claims up to one-third of all accidents.

Mr. Jackson says that the liberal policy of the Department of Street Railways, as in paying the time of platform men when they testify, is reflected in the comparatively small number of blind accidents. It is said that co-operation with the coroner's office is closer knit than in the days of private operation.

Mr. Jackson devotes considerable space to a discussion of the methods of handling accidents by the claim department. These are, in general, the same as those of many street railways in the United States. The bonus system, by which carefully trained men are rewarded for accident reduction, is also described. The consultant states that he has little faith in the enduring good of "safety week" and "similar ballyhoo campaigns." The best results are going to come from making the old equipment safer, teaching the men the correct principles of controller and brake operation,

providing the incentive of line comparisons and of individual bonus plants; and, finally, of persistent work with those who are involved in nearly three-fourths of all accidents—the autoists.

Practices in Handling Supplies

Bulletin No. 6 deals with the supply division. Mr. Jackson states that in Detroit no purchase exceeding $500 may be made without advertising for bids, and that this limitation needs some modification to assure the most successful conduct of the Department of Street Railways. For example, lubricating oil is sold on a service basis; and to a lesser degree, this combination of material and service applies to bearings, trolley wheels, etc. He states that he does not wish to imply that the disadvantage of advertising for bids is peculiar to municipal operation. Perhaps the strongest argument that can be offered for permitting greater purchasing freedom is that the city's accounting system is wide open, and any one who questions excessive costs can have access to public documents.

Centralized purchasing is stated to have many benefits. Many of the stores cover several municipal departments and the street railway and other departments can draw upon common sources for certain supplies, such as crushed granite or cement, in addition to their smaller local stores.

All purchasing is done through the department of purchases and supplies of the city. Mr. Jackson goes into considerable detail in describing the requisition system. He states that the concentration of purchasing and storekeeping is an improvement over the practice of the Detroit United Railway, which maintained several independent storekeepers for the track, overhead and car maintenance departments, who were checked by assistant auditors or controllers at the main office.

The centralized stores plan also is said to save much mileage in the transport of goods to several departments. The city's stores division took over four service cars from the Detroit United, and has bought fifteen flat cars at a cost of $175 each, which have been fitted up for trailer use at an additional total cost of $500.

A considerable part of the bulletin is taken up with a discussion of the improved method adopted by this department for handling scrap. It is stated the salvaged material will bring $200,000 to $300,000 a year.

Finance and Auditing

In Bulletin No. 7 Mr. Jackson discusses the financial practices of the Department of Street Railways. Regarding a municipal loan he states that a municipality is compelled by law to set up a sinking fund whereby the loan will surely be paid back on the date the bond matures. Continuing, he says:

"Private utilities have not been compelled to do this, although it certainly would have been better for electric railways especially if they had been. What they generally did may be explained in this homely fashion:

"A person borrows $10 for three months. He pays interest regularly, but cannot restore the principal when the three months are up. So on the strength of his faithful payment of interest, he borrows $12 from some one else for another three months, using $10 to wipe out debt No. 1. Again he pays interest faithfully and again he is unable to restore the principal. Thereupon he uses his credit again to borrow $15, pays back the $12 and begins the merry-go-round again until some catastrophe makes it impossible for him to pay continually increasing interest charges. That is the way most electric railways were financed for many years, deluding themselves with the notion that the plan was going to come out all right through the increased earnings from a growing community."

Contrasting this with the terms of the Detroit purchase, Mr. Jackson continues:

"The purchase price [of the Detroit United Railway] exclusive of inventory, was $19,850,000. Toward this sum it [the city] made an initial down payment of $2,770,000 secured not from railway revenue but from the $4,000,000 bond issue authorized by a vote of the people on April 17, 1922."

It is stated that the department has already paid $3,770,000 to the Detroit United, of which sum $1,000,000 came out of earnings within seven months. Preceding the purchase of the D.U.R. and the $4,000,000 bond issue, which included the down payment of $2,770,000 and $400,000 for supplies, was the original $15,000,000 bond issue authorized by the vote of the people on April 5, 1920. This money was voted for the purpose of building and equipping entirely new lines in the outer area of Detroit, but with it were built 63 miles of track, an office building and carhouse were put up, and 250 safety cars and fifty Peter Witt cars purchased. The remainder of about $1,000,000 was left as partial payment for 200 Peter Witt cars bought for the system as a whole.

Mr. Jackson quotes from the report of the Glasgow Corporation Tramways for the year ending May 31, 1918, during which interest and sinking fund payments were reduced to zero. He says that payments into the sinking fund from 1896 to 1917 totaled £3,833,157. The direct sinking fund payments totaled only £1,506,267, the remaining £2,328,890 coming by transfer from the depreciation and permanent way renewals fund. He states that on the same basis as Glasgow, Detroit would have paid less than $500,000 a year against the purchase price instead of $1,000,000 a year. He says that the city of Detroit is paying so rapidly for its street railways that the older and major portion will be only a minor capital charge after ten years.

"This period is so short," says Mr. Jackson, "that one may well question the justice of a depreciation fund particularly when the property itself was taken over at a very low price regardless of its run-down and largely obsolete condition.

"As a matter of fact, a private company would have thought it worth $10,000,000 merely to have the right to handle the mass transport of the fourth and fastest-growing city in America. If every car and piece of track bought from the Detroit United has to be replaced with new, additional capital, the purchase would still be a bargain because of the wonderful traffic possibilities of Detroit."

To indicate how little new money the city of Detroit has put into the Department of Street Railways to make the D.U.R. lines as modern as those built by the department, he contrasts it with Toronto. He states that the Toronto lines built by the city before purchase cost $2,750,000, whereas Detroit's new lines cost about $14,000,000. The total investment in the Toronto lines, including some $25,000,000 of new construction, is given as $29,481,000. Adding to this the arbitration sum for purchase of the Toronto Railway, of $11,000,000 to $12,000,000, makes a total cost to the city of Toronto of some $41,000,000.

Considerable space is taken with quotations from "Service at Cost Plans," by Harlow C. Clark, to show that he thinks writing off the investment an unfair burden on the present rider so long as there is a depreciation fund.

Mr. Jackson states that such an outcry was raised at the last election that the plan for relieving the Department of Street Railways of paving charges was rejected.

Mr. Jackson says that a depreciation fund is justifiable only on the new construction and equipment of the department of street railways. He continues as follows:

"The sharpest criticism directed at the financing of the Department of Street Railways has been the failure to set up a depreciation and renewals fund, although the critics have been calm about the rapid rate of amortization. One could easily argue that if amortization is a gift for the rider of the future by the rider of the present, why not equalize matters by simply keeping the property up to safe and efficient operating standards? In short, repeat the ancient claim that property was being kept 100 per cent efficient and that a depreciation fund for something that wasn't allowed to depreciate was a joke.

"As a matter of sound finance, however, one must set aside a depreciation and renewals fund because one must be prepared to meet changes in the art. A private company may take the view that it is better to have a satisfactory depreciation fund than a proper sinking fund, but a community lives not only for its citizens of today but for those of tomorrow. It must, therefore, in the absence of a profit-seeking motive carry both classes of charges.

"In the case of Detroit, this is far from meaning that the depreciation and renewals fund should cover all of the existing property. On the contrary, that secured from the Detroit United Railway was bought so cheaply and is to be paid for so quickly that a depreciation fund is unnecessary. The only way to look at most of this property is that it is something to be replaced gradually with entirely new parts to be supplied legitimately out of new capital or, in part, out of surplus earnings. The position is not unlike that of the Boston Elevated Railway as expressed in the Jan. 2, 1923, report of the Department of Public Utilities of Massachusetts (quoted on page 201, ELECTRIC RAILWAY JOURNAL, Feb. 3, 1923) where the commission says: 'In fixing the amount for depreciation, the property excluded from consideration was that listed as obsolete, not used or non-depreciable (like land) and that older than the estimated life.'

"If this criterion is applied to the Detroit United purchase and the cost of said purchase taken into consideration, there would be very little left to call for a depreciation fund."

To show that a depreciation fund should be set up only on the new construction and equipment put in by the Department of Street Railways, Mr. Jackson compares Detroit with the cities of Boston, Glasgow and Chicago:

"Taking Boston and Glasgow standards for guidance the highest rate of depreciation for the cars, amounting so far to a total of $2,241,275, would be 5 per cent, or roughly $112,000 a year. The rate of depreciation on the type of track used should not exceed 2 per cent to 3 per cent, while the buildings would carry no more than 2 per cent. The land purchased by the department naturally has increased in value because of the new transit facilities in the neighborhood.

"Suppose we were to take the highest figure quoted by the commission, namely, 3 per cent of the investment in road and equipment complete as used by the Chicago Surface Lines, then 3 per cent of the $14,000,000 actually at work now would be $420,000."

Mr. Jackson says there would be no trouble in finding the $420,000 for a depreciation and renewals fund, nor in finding twice that amount, because in the six months of full system operation, July 1-Dec. 31, 1922, the surplus, after all overhead charges, injuries and damage reserves, etc., was $512,278, or at the rate of $1,024,556 per annum.

Concluding, Mr. Jackson says: "From the viewpoint of public policy, it is also better to put surplus into funds for renewals and enlargements than to give a wrong idea that the surplus should be used to reduce taxes or make premature reduction from a fare that is either the lowest or next to the lowest big-city fare in the United States."

Speeding Up Surface Cars in London

THE London County Council is readjusting the motor equipment of its cars with a view to obtaining higher schedule speeds. Results secured with cars recently built and fitted with larger motors than had been used previously showed that considerable economy was effected in cost of operation while higher speeds and a better service were provided.

At a meeting of the Council held on March 13, it was decided that 200 cars, which have been in use since 1907 to 1921, shall be fitted with 60-hp. motors in place of 42-hp. motors. The motors released will be used to replace 30-hp. and 35-hp. motors on cars which have been in operation for twenty years. The changes will be made first on the lines which are located south of the Thames.

A probable result of the change in motor equipment will be the withdrawal of trailers from the southern route to determine whether the faster cars can handle the rush-hour traffic. If they are successful the trailer service will not be restored, as there was considerable opposition to its inauguration, and sanction to furnish it was obtained only after a hard fight in Parliament. When this sanction was obtained the schedule speeds were low, but the average speed is now reported to be more than 9 m.p.h.

Power Supply for British Electrification

THE London Electric Supply Corporation plans immediately to extend its power station at Deptford to enable it to supply the 80,000,000 to 100,000,000 kw.-hr. which will be required annually for electrical operation on the southeastern section of the Southern Railway. Before the recent amalgamation, this section was the Southeastern Railway. The Supply Corporation secured a contract covering fifty years supply of all of the energy required for the operation of the first section of the suburban lines of this railroad. The contract is the outcome of a recent decision of the Electricity Commissioners adverse to the erection of a power station by the railroad. Announcement of the contract was made by the chairman, W. H. Wilson, at the annual meeting of the London Electric Supply Corporation, held on Feb. 23.

The Readers' Forum

When the Bus Will Replace the Urban Railway

GENERAL ELECTRIC COMPANY

SCHENECTADY, N. Y., April 10, 1923.

To the Editors:

I want to congratulate the writer of the editorial in the last issue of the JOURNAL entitled "When the Bus Will Replace the Urban Railway." You know very well what my views on this subject are, and I want to say that I have never seen a more comprehensive and yet more concise statement of the facts in the case as they appear to us as a result of all of our studies and experience. I think that had the railway advocates in Saginaw been able to express their case as well as this writer has done, they might have had a better chance of success at the election. I think this supplements very admirably the answer James W. Welsh recently made to an article in the *Wall Street Journal*, and I think the whole railway industry owes you a vote of thanks for its publication. J. C. THIRLWALL.

Connecting Armatures on the Ground Side

SOUTHERN PUBLIC UTILITIES COMPANY

CHARLOTTE, N. C., April 6, 1923.

To the Editors:

We had considerable trouble on our cars, due to flashing over of the motors. Considerable oil and grease would collect around the end of the commutators on our old-type motors. This caused flashing, and the motor parts were often badly burned and sometimes the armatures were grounded. After much experimenting we tried placing the armatures on the ground side and grounded the brush-holder instead of the field coils. Motors with these changes have now been in service over three months and our motor trouble has been reduced one-third.

Perhaps this information may be of use to others who are having similar trouble.

W. B. OSBORN, Master Mechanic.

Suggestion to Prevent Theft of Incandescent Lamps

SUSQUEHANNA TRACTION COMPANY

LOCK HAVEN, PA., April 4, 1923.

To the Editors:

Referring to your issue of March 24 in which "Executive" refers to method for stopping theft of incandescent lamps, some years ago I called the matter to your attention with the suggestion that theft could be stopped by the use of the left-hand thread in the receptacle instead of the right-hand thread as ordinarily used.

A representative of one of the largest lamp companies informed me that lamps were furnished to European trade with left-hand thread, but otherwise identically the same as the lamps furnished in this country. It was also stated that the manufacturers of sockets and receptacles made them both with right and left-hand threads. The right and left-hand thread portions were stated to be interchangeable so that the present right-hand receptacle could be changed quickly to left-hand type with almost negligible expense.

I believe that this offers the ideal solution of the problem and suggest that the ELECTRIC RAILWAY JOURNAL take the matter up with the respective manufacturers and then lay the facts before your readers. It is believed that this will be well worth while.

HAMILTON BALUSS, General Manager.

Schedule Dials of Houghton County Traction Company

WHEN traffic possibilities do not permit short-headway service, the next best thing is to make sure that the public knows exactly when the cars are available. With this thought in mind, S. B. Tuell, receiver of the Houghton County Traction Company, some time ago had installed sets of schedule dials at various places on the system. Such dials are especially



Dials Over the Sidewalk Indicate When Cars Pass in the City of Houghton

useful in the case of service between the twin cities of Houghton and Hancock, for while the schedule calls for four cars an hour it is necessary to space the cars at unequal intervals. An accompanying illustration shows a set of such dials mounted on a steel pole.

Besides giving the public appreciated information as to the service, the dials are a continuous advertisement of the electric railway's service.

The fortieth anniversary of the inauguration of tramway service on the Huddersfield (England) Tramways System was celebrated recently. According to the *Electric Railway & Tramway Journal*, the first vehicle was a steam-driven car, horse cars being added later. Steam traction, however, proved preferable to the use of horses and was used until the time of the electrification of the system in 1902. The corporation now has 126 cars and ten omnibuses in commission.

Association News & Discussions

Spring Convention of A.I.E.E.

THE 1923 spring convention of the American Institute of Electrical Engineers will be held at the William Penn Hotel, Pittsburgh, Pa., Tuesday to Thursday, April 24 to 26. The keynote of the program will be the operation, control and protection of transmission and distribution systems. Technical sessions will be held Tuesday afternoon and evening, Wednesday morning and afternoon and Thursday morning. A banquet will be the feature on Wednesday evening and an inspection trip to the Westinghouse Works on Thursday afternoon and evening. For those who wish to remain over, other inspection trips will be arranged for Friday.

Massachusetts Safety Conference

THE Massachusetts Safety Council will hold its second annual state conference in Springfield, Mass., on April 25-26, probably at the Hotel Kimball. The first day will be devoted to accidents on the highway, with two or three general safety topics. Thursday morning will be assigned to industrial accident problems, with several notable speakers, and the balance of the day will be devoted to considerations of fire prevention.

National Conference on City Planning

THE fifteenth annual conference on city planning will be held at the Southern Hotel, Baltimore, Md., on April 30 and May 1 and 2. The conference will be entertained by the city of Baltimore in co-operation with many civic and professional organizations. Among the papers to be presented will be one on "Inter and Intra Urban Transit and Traffic as a Regional Planning Problem," by George A. Damon, Pasadena, Calif. Other topics to be considered are terminals, zoning, regional planning, and parking of automobiles.

Canadian Association Planning for Convention

ALTHOUGH the date of the next convention of the Canadian Electric Railway Association has not been set, it may be held early in the present summer. The executive committee has therefore appointed convention committees. An exhibit will be a feature of the convention as in 1922, when the first and highly successful exhibit was held in Quebec. A representative committee of operating men and representatives of manufacturers have been appointed to arrange for the exhibit. W. R. McRae, Toronto Transportation Commission, will be chairman of the entertainment committee and will select the other members. The president of the association, Major F. D. Burpee, will arrange for the papers to be presented at the convention. As decided earlier, the convention will be held in Toronto.

Gear Manufacturers to Meet

THE seventh annual meeting of the American Gear Manufacturers' Association will be held in Cleveland, Ohio, April 19 to 21, with headquarters at the Hotel Cleveland.

Among the papers and addresses which will be given are the following: "What Does the Microscope Tell Us?" by E. C. Smith; "Grinding and Measuring Involute Gear Teeth," by E. J. Lees; "The Gear Testing Machine," by Wilfred Lewis; "Industrial Relations," by Frank A. Scott; "Some Thoughts of an Investment Banker on the Gear Business," by Owen A. Locke. There will also be a conference on conditions in the industry.

Wood Preservation

A MEETING of the Engineering Association committee on wood preservation was held at headquarters in New York City on April 13. The subject of discussion was the specifications for wood preservatives, particularly with reference to the methods of testing. The new test for coke residue was approved, subject to similar action by the A.S.T.M. at its June meeting. This test eliminates the glass bulb and utilizes the platinum crucible. The same action was taken with regard to the elimination of the specific gravity clause in the specifications for coal tar, creosote oil, creosote coal tar mixture, coal tar oil for wood paving blocks and distillate oil for paving blocks.

It was decided to suggest an investigation as to the opinion of member companies regarding the relative value of the flask and the retort in distillation tests.

The meeting was attended by H. H. George, chairman; A. P. Way, vice-chairman; M. J. Curtin, W. H. Fulweiler, E. F. Hartmann, E. A. Hoffman and E. L. Morier.

American Association News

Manufacturers' Committee Prepares Booklet

THE committee on co-operation of manufacturers of the American Association, of which E. F. Wickwire is chairman, has prepared a readable, instructive and typographically attractive booklet for distribution by manufacturers among their employees. It is entitled "An Old Friend Now Is Getting a Living Wage," and gives the reader actual data as to present electric railway operation. The "Old Friend" is, of course, the electric railway. The booklet is designed to enlist the co-operation of employees of manufacturers in obtaining a square deal for the electric railways, their customers.

Copies of the booklet can be obtained at association headquarters.

Inductive Co-ordination Committee Meets

THE sub-committee on inductive co-ordination of the power distribution committee, American Electric Railway Association, met at Purdue University, La Fayette, Ind., April 5. Three of the four members were present, John Leisenring, chairman; Prof. D. D. Ewing and A. Schlesinger. At this meeting the replies to data sheets sent out requesting information on transmission line parallels with telephone circuits were reviewed and discussed and a more elaborate letter requesting information in greater detail prepared.

It was the consensus of opinion of the sub-committee that the matter of inductive co-ordination was one that had been more or less neglected by the American Electric Railway Engineering Association. Hope was expressed that member companies will give the letter, which they will shortly receive, the attention it deserves, as the entire subject is of great interest to the association as a whole as well as to the individual members.

New Statistics Available

THE following special reports have been prepared by the bureau of information and service of the American Association and are available to member companies in good standing upon request:

Traffic Ratios: Statement showing in tabular form the riding habit, the average fare, average speed, revenue passengers and car-miles per mile of track and per car operated, revenue per mile of track, operating ratio, passengers per car-mile, proportion of transfer passengers and operating income per mile of track of more than 300 companies divided into city and interurban groups. Each group is further subdivided into three parts according to the sizes of the companies.

Bus Specifications and Operating Costs: Gives specifications of all buses of American make, and also contains the 1922 operating reports of the London General Omnibus Company, the Baltimore Transit Company, the Chicago Motor Bus Company and the Washington (D. C.) Rapid Transit Company.

One-Man Car Operation: Contains complete list of companies operating one-man cars, showing separately those operating one-man cars exclusively. Also gives a statement of the average cost of operation with one-man cars based on reports for 1922 of companies operating only one-man cars.

Treatment of Depreciation Reserve Funds: Abstracts of court and commission decisions fixing and discussing the proper disposition and use of these funds. Includes both electric railway cases and cases involving other public utilities.

In addition to the above, supplements to the Wage Bulletin, Fare Bulletin, and Cost of Living Studies have been prepared, bringing these sources of information down to date.

Maintenance of Equipment

Unusual Block Signal Installation

BY H. B. CHARTERS
Portland Railway, Light & Power Company, Portland, Ore.

THE Portland Railway, Light & Power Company recently had occasion to employ a rather unique arrangement of United States, Type G-1, trolley contactor block signals, to cover a special situation where it was required to furnish protection for a train entering a block from an intermediate switch.

While in most cases of this kind it probably would be advisable to divide the track into two blocks, in this instance the distance was too short and local conditions, such as the presence of two curves and a deep cut obscuring the view, further complicated the proposition.

In Fig. 1, *A* and *C* were the original limits of the block and an additional signal was installed at *B* to enable trains to enter the block from a gravel pit, located on the spur, without backing to *A* to set the signals. When a southbound train takes the block at *A* the motorman receives a proceed indication of a yellow light and a yellow semaphore blade and the signals at *B* and *C* show a red light and a red semaphore.

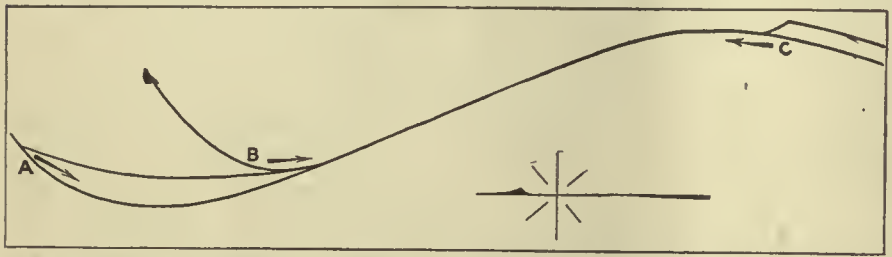


Fig. 1—Signals Arranged to Protect Cars Entering Block from Intermediate Switch

A train taking the block at *B* displays a stop signal at *A* and *C*. Likewise a northbound train is protected at *A* and *B*.

When a car passes out of the block at either location the signals are restored to normal, i.e., no lights or semaphores showing.

In the wiring diagram, Fig. 2, it will be seen that the original connection of No. 2 wire was changed to the opposite side of coil *C*, thus causing the signaling circuit to be interrupted at the entering end only instead of at the leaving end of the block.

This was necessary because under the previous plan of connections interrupting the circuit at the leaving end of the block left one red signal in circuit, thus holding magnet *A* in the energized position.

Putting the two red signals in multiple required additional terminal resistance, which was provided by substituting one 550-ohm tube for the two 175-ohm tubes normally in the signal.

Sixty-four-watt carbon lamps are used behind the yellow lens and 36-watt Mazda lamps behind the red.

This arrangement has been in service for some time, with no failures as yet reported.

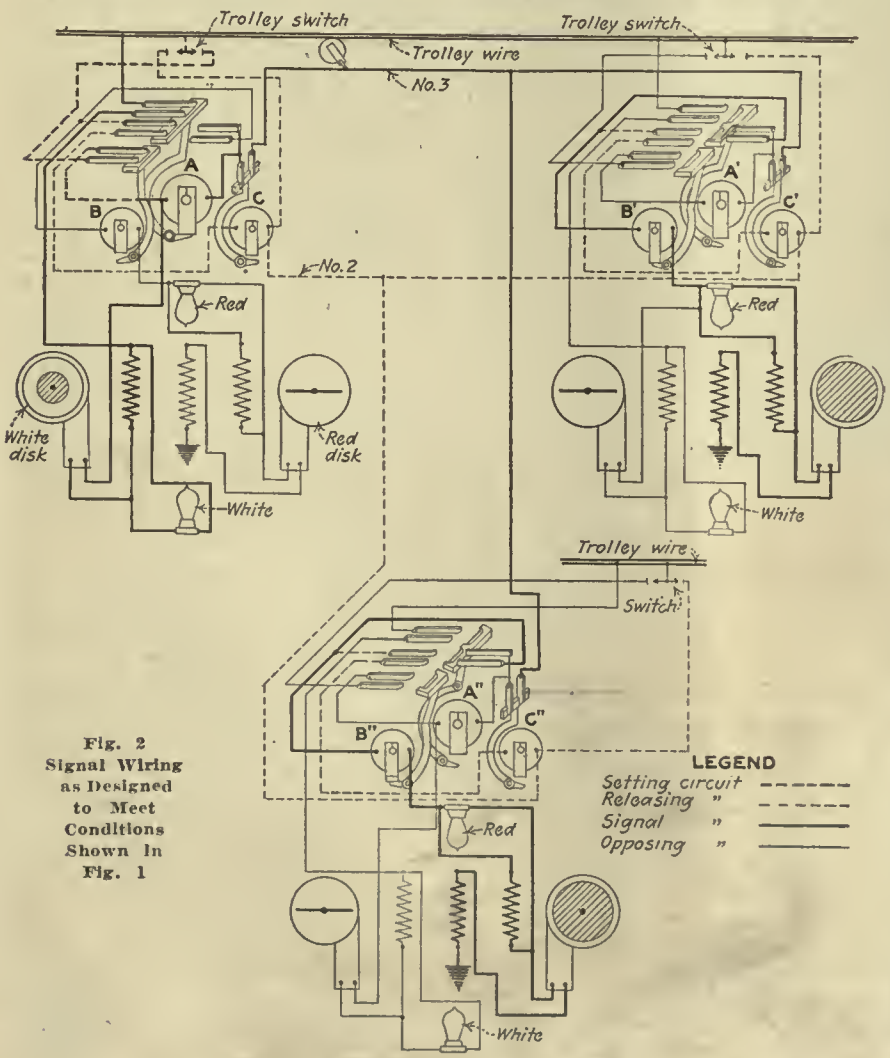


Fig. 2 Signal Wiring as Designed to Meet Conditions Shown In Fig. 1

Dipping and Baking Armature Coils

BY JOHN S. DEAN
Renewal Parts Engineering, Westinghouse Electric & Manufacturing Company

IT IS the unanimous opinion among railway operators that the treatment of armature coils by dipping them in a good grade of insulating varnish, and then baking them, greatly improves the insulation and lengthens the life of these coils in service. In this connection, in a great many cases, there is very little thought given to the many details associated with these operations, but

experience has shown that these are essential in order to get the best possible results from this method of treatment.

One important point which has been found to be very necessary, and that should be given some consideration, is to see that the individual coils are separated during the dipping and baking operations. When the coils are arranged as shown in an accompanying illustration, the varnish is able to reach all exposed surfaces of the coils. This permits an even penetration of the insulation when they are dipped in the tank of varnish.

Heat Reaches All Surfaces If Coils Are Properly Separated

Likewise, when the coils are placed in the baking oven, arranged as shown, the heat from the oven is better able to reach all of the treated surfaces of the dipped coil, and the varnish is more equally and uniformly baked. This precaution in connection with this treatment requires considerably more labor in the handling of the coils and additional equipment, which increases the cost, but the improved insulation of the finished coil warrants this additional expense.

It is very common practice, in connection with doing this work, to dip and bake such coils in bundles, which is cheaper and tends to speed up the work, but produces questionable results.

Other details in connection with this work which should be given some thought are as follows:

1. *Quality of Baking Varnish Best Suited for the Work.*—The varnish should possess a high dielectric strength and be acid, oil, and moisture resisting. When baked, it should finish, or set, with a hard surface, having considerable flexibility, which makes it firm in resisting mechanical injury.

2. *Specific Gravity or Density of the Varnish Must Be Kept Just Right.*—If the varnish is too thick, it will not penetrate the insulation, and if too thin, it will lack body and be of little value in improving the dielectric strength of the insulation of the finished coil.

3. *Time of Baking.*—If baked for too short a time, the varnish will not set properly, and if baked for too long a time the fibrous insulating materials may be damaged.

4. *Temperature of Baking Oven.*—If the temperature is too low the varnish will not set, and you may have coils that are wet inside. If baked at too high a temperature the cotton insulation may be damaged, causing it to disintegrate rapidly.

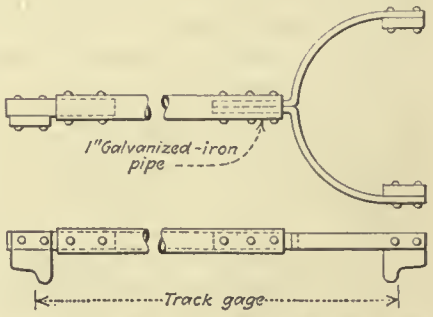
5. *Ventilation of the Oven.*—Unless proper ventilation of the oven is provided to furnish a change of air around the coils, the baking process will be retarded and may result in the varnish setting or hardening only on the surface of the coils.

Device for Testing Gage in Switches and on Curves

By J. S. Wilder,
Engineer of Maintenance of Way Municipal Railway of St. Petersburg, Fla.

THE accompanying illustration shows a gage which we have been using for some time as a check on the installation of switches. The gage consists of a piece of galvanized iron pipe, carrying at one end a rod to which is attached a piece of iron plate cut to the contour of a wheel tread and flange, while on the other end are two similar plates riveted to a fork. When the fork end of the gage is held against the gage side of the rail or the bearing surface in the case of special trackwork, the gage is obviously normal to it at this point, and hence can be used in determining the gage of the track accurately at the location.

This gage was made because we noticed at times that wheel flanges were riding or bearing too close to mate or frog points. For instance, this year, while we were installing four

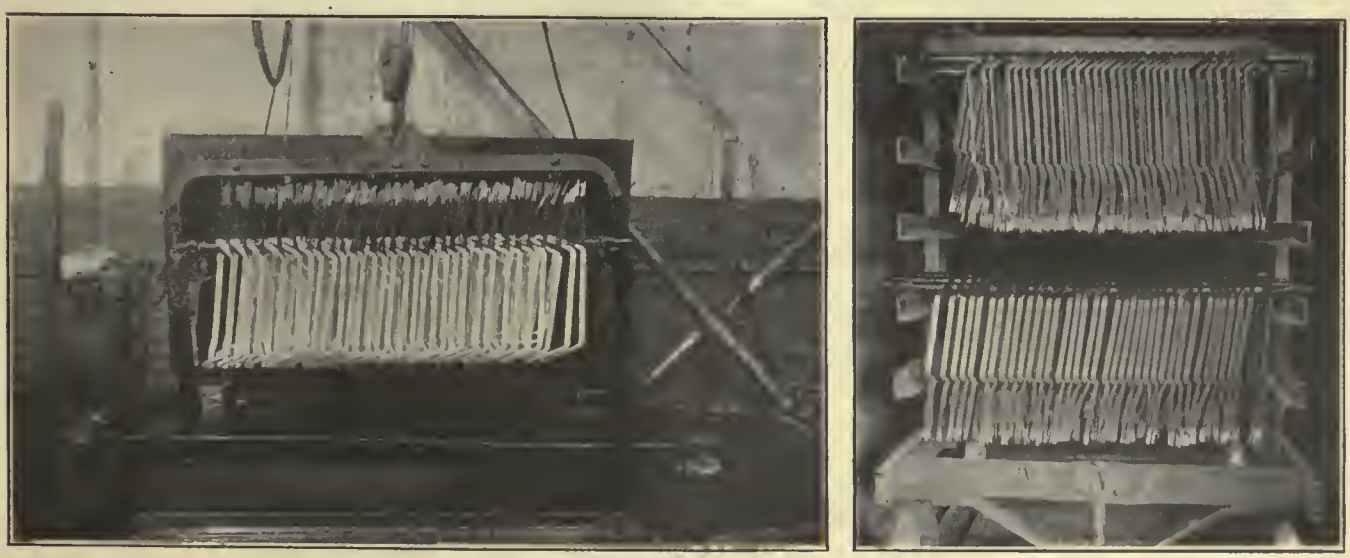


Forked Device for Determining Track Gage

new wye tracks, for which the pieces of special trackwork were made by one of the largest manufacturers, we found in several instances a slight variation in track gage. By means of our device we were able to get better clearance of wheel flanges at the mate points, either opening or closing the track gage slightly. On one wye track, the gage had to be closed nearly ¼ in. more than standard on the straight side, to secure a reasonably good gage through the curve. At the wye end, the gage had to be opened up a quarter inch throughout the entire switch piece.

We aim to allow the outer flange of a wheel when new just to touch, or nearly to touch, the edge of the head of the rail on double-guard curves, as experience has shown that this gives the best operation.

As a result of these adjustments the operation of cars over these



At Left, Coils Are Separated During Dipping and Baking. At Right, Coils Arranged in Oven So That Heat Will Reach All Parts

tracks has been entirely satisfactory, which it would not otherwise have been.

This year we had occasion to move a passing track from one location to another. We had been unable to operate cars to the left on this passing track on account of wheel flanges riding or straddling the mate point. We shortened one lead rail at each end, moving the mate piece ahead of the position originally intended, so that cars could go either to the right or left as necessary. Our gage device came in handy in determining the amount necessary to cut off the lead rail.

I do not know whether this device is original, but I have seen nothing of the kind on the market. While we do not claim it to be scientifically correct, it is a handy, practical check on trackwork.

A Method for Washing Waste

THE following method of washing waste used in motor bearings has been in use on a large Eastern railway system for a number of years with satisfactory results. A tank is used with a screen placed about 20 in. from the bottom. Oil heated to 170 deg. F. is poured over the waste placed on this screen. The hot oil carries the dirt and sediment from the waste and this settles in the bottom of the tank. The top oil from the bottom of the tank is used for the washing, and this can also be used in motor and journal bearings when it has been properly reclaimed.

Shop Lathe Used for Banding Armatures

A LATHE that was formerly used in the machine shop of the Los Angeles (Calif.) Railway has been converted into a satisfactory armature banding machine by J. L. Clark, superintendent of electrical repairs. The lathe has a 25-in. swing and a two-speed gear. It is operated by a 3-hp. motor.

The armature to be wound is lifted into place on the lathe by a pneumatic hoist, and then turned the same as metal or wood is turned on shop lathes. The wire for banding is carried on a spool behind the worker. It runs over a pulley which has weights attached to keep the wire taut.

A pedal for foot control has been constructed of iron pipe. This is connected to the belt shifter by links and a bell-crank lever, so that the lathe can be stopped and started as desired by the operator and still leave his hands free for the banding.



Attachments Added to Lathe for Banding Armatures

Jacking Out Poles in Birmingham

A NOVEL plan has been used on the Birmingham (England) Corporation Tramways for lifting steel poles out of the ground without excavation. It was devised by the engineering firm of Hollings & Guest of Birmingham, and is described and illustrated in a recent issue of the *Tramway & Railway World*.

A split clamp with projecting flanges is bolted to the pole at a suitable height, and the pole is lifted by means of two hydraulic jacks placed one on each side. Pressure for the jacks is supplied by a hand pump. The travel of the jack plungers is, of course, small, so that it is necessary gradually to lower the split clamp on the pole as the latter rises from the ground.

This plan was used recently on a job where a large number of poles had to be removed in connection with a change in the method of transportation on one route.

New Equipment Available

Dustless Ash Conveyor for Power Plant

A TYPE of ash conveyor which is new in this country, although successfully used in Europe, is being marketed by the Combustion Engineering Corporation, New York, as the "Combusto" ash conveyor.

This conveyor consists of a double chain scraper or drag conveyor moving in a trough containing water, the trough being located under the ash discharge of the stoker. Ashes and clinker fall from the stoker, or through the clinker grinder, directly into this trough and are quenched and immediately carried along by the conveyor and deposited in a large storage hopper or car.

A feature of this conveyor is the water seal, as the chute which forms the ash discharge of the stoker extends below the water level in the trough. This prevents the formation of dust, and further the rapid quenching of the hot clinker breaks it into smaller pieces, thus facilitating removal by the conveyor. The use of a duplex conveyor, consisting of two water troughs, is recommended where there is no ash hopper under the stoker or where the capacity is limited so that in case of a shutdown of one conveyor for any reason, the other may be started immediately. Where there is already a basement and hoppers are of fair capacity, the single conveyor may be used, a suitable door being provided for emptying the hopper periodically into cars or trucks while repairs are made to the conveyor.

The trough may be either of cast-iron or concrete construction. If of the former the sides and bottom are made in sections 4 ft. long and ⅝ in. thick.

The sheet-steel scrapers working in the trough are 18 x 4 x ½ in. in dimensions, and they are attached, on 17-in. centers, to the driving chains. The driving sprockets, situated at the end of the incline which is usually provided so that ashes may be discharged into cars or a bunker or otherwise disposed of, are connected by means of reduction gears to the driving motor or engine so that the maximum speed of the conveyor will be about 14 ft. per minute. At this speed the power consumption is estimated at about ¾ hp. per 1,000 lb. of refuse per hour, depending upon the length of the trough, etc. The capacity of the conveyor under these conditions will be about 2½ tons per hour.

The News of the Industry

Paving Case Decided

Franchise Requirement Compelling Company to Finance Repaving Between Tracks Held Reasonable

In an opinion handed down on April 17, 1922, of which printed copies have recently been received, the Public Service Commission of Pennsylvania expresses the opinion that the repairs to the tracks of the Reading Transit & Light Company in Pottstown, and the pavement between the rails and on each side thereof as set forth in the report of the engineering conference, are necessary for the public safety and convenience, and are just and reasonable for the respondent to make.

In consequence, the commission entered an order requiring the company within six months from the date of service of the order to do all work necessary to repave and repair the pavement in all streets in the complainant's borough occupied by the company as set forth and described in the report of the engineering conference in this case. All this work was to be done at the company's own cost and expense.

Ordinance Required Paving

In the franchise ordinances granted by the Borough of Pottstown to the company, it was provided that the respondent should pave and keep in repair so much of the street occupied by its track as was between the rails and 2 ft. on each side. The ordinances specified the character of the pavement to be laid. The streets were first occupied by the railway in 1906. The Borough of Pottstown complained that the company had not complied with the terms and conditions of the franchise ordinance alleging: that the condition of the street paving was extremely bad and that the company's attention had repeatedly been called to the existing condition of the paving and that the respondent had been requested to repair the same in compliance with the conditions prescribed in the ordinance. Further, it was charged that notwithstanding such notice and request the company had failed to make the necessary repairs and that the condition of that part of the streets occupied by the company had become an absolute menace to public travel.

The company acknowledged receiving request from the borough, but denied that the paving was in bad condition, and further averred that the duties sought to be imposed upon it by the complainant to repave the several streets as set forth in this complaint were unjust, unreasonable, unlawful and burdensome, and that the company was without the necessary funds to repave the street and maintain it. Furthermore, the railway contended that the franchise ordinances of its constituent companies were unjust, discriminatory, burdensome, and in violation of the Pennsylvania public service company law.

An engineering conference was agreed upon and personal inspection was made by the members of the paving complained of, and a full report relating thereto, duly signed by the three members of the conference including the engineer of the railway, was offered in evidence. In this report it was set forth in detail the work necessary to be done on the several streets in the complaining borough in which the respondent's tracks were laid.

Methods Not Prescribed by Commission

There was a disagreement in the conference, however, as to the kind or type of base which should be laid in the street before the paving was relaid. The commission said that the question of whether or not the repairs shown to be necessary in this case should be made as contended by the borough's engineer or in the manner suggested by the railway engineer was not for the commission to determine. It merely held that the work should be done in some substantial manner as the safety and convenience of the public demanded. The method to be employed was left for the respondent company to determine. In this connection the commission pointed out that as the pavement must hereafter be maintained, it behooved the railway to have the same laid in a substantial manner.

Relieved of Paving Costs in San Diego

At the primary election held on March 20 in San Diego, Calif., the amendment with respect to paving carried by a safe majority. This vote relieves the San Diego Electric Railway of the cost of new paving on streets now occupied by the company's tracks.

Following approval by the voters of this amendment to the city charter exempting street railways from paving between and alongside tracks on streets not now paved but which may hereafter be paved, the San Diego (Calif.) Electric Railway and the Bay Shore Railway have made application to the City Council to have the provision written into their general franchises. A similar amendment was defeated at a special election last fall, but the amendment approved by the voters at the recent primary election was more explicit and apparently suited the voters better, as they approved it along with eight other amendments, all of which were ratified by the California legislature, now in session.

New Transit Bill Appears

Substitute Home Rule Bill Introduced in New York Assembly by Republicans

The Republican counter-proposal to the Hylan-Smith plan for New York City control over transit and other public utilities was laid before the Assembly on April 10. It is in the form of a bill sponsored by Assemblyman George N. Jesse and provides for a city transportation commission appointed by the Mayor. According to the proponents of the Jesse measure, it offers a degree of home rule sufficient to meet the city's needs.

The measure contains definite provisions for:

1. A transportation commission of three members, named by the Mayor, but whose salaries and terms of office are to be fixed by the Board of Estimate.
2. The commission without the consent of any other body to lay out routes, build new subways and contract for their operation at a rate of fare to be agreed on by the city and the operating company.
3. The contracts which the city has made in regard to the present subways or other means of transit now existing being carried out without interference from the State.
4. The commission reducing but not increasing charges over those provided by statute, thus limiting its rate-making powers.
5. Assuring a universal 5-cent fare from any part of the city to any other part of the city.

The measure is said to be satisfactory to Republicans, who felt it would be politically unwise completely to turn down Mayor Hylan's demands for a voice in transit regulation, as at first proposed by some of their colleagues.

In a statement given out in connection with the introduction of the bill Assemblyman Jesse said:

> The predominant feature of the 1921 legislation amending the public service commission law was that the Public Service Commission and the Transit Commission could, if in their judgment necessity demanded, increase a rate, even though a lower rate had been fixed by law, by franchise or contract. The bill now introduced prohibits this by withdrawing power from the commissions. This applies not only to rates of fare on transit lines, but also for gas, electric, steam, telephone and telegraph service.
>
> The 1921 legislation also provided in respect to the plan of readjustment of transit companies that the Transit Commission was empowered to make that such plan could be put into effect over the possible objection of the local Board of Estimate and Apportionment. The pending bill provides explicitly that any such plan must receive the approval of such local board.
>
> The Transit Commission never used these broad powers but the fact that it had them furnished the occasion for all kinds of demagogic charges as to what the Transit Commission was going to do. There was wide-spread criticism of the 1921 legislation on the ground that these provisions violated the principles of home rule. The pending bill should abundantly satisfy the sincere advocates of home rule, because it more than restores the powers claimed to have been taken away in 1921.
>
> The pending bill gives the city full and complete power over rapid transit plans and contracts. The original rapid transit act was passed in 1891, and in 1894 was amended to provide for municipal construction. The original commissioners were named in the act and the rapid transit powers have always been exercised by State officials, in turn by the Rapid Transit

Board, the Public Service Commission for the first district, and Transit Construction Commissioner, and the Transit Commission. From time to time powers of approval were given to the Board of Estimate and Apportionment, but never powers of initiation and direction. Now it is proposed to take away all these powers from the State agency and turn them over without reservation to the city authorities.

Therefore, the bill not only restores such measures of home rule as existed in the local authorities prior to the legislation of 1921, but goes much further and makes the city authorities thoroughly independent in the planning and building of subways.

$500,000 for Improvements in Albany

The United Traction Company, Albany, N. Y., will spend nearly $500,000 this summer in Albany and the surrounding cities in an effort to improve its service in preparation for the commercial and building developments under way in the capital district.

Announcement of this improvement was made on April 7 by Ernest G. Murphy, superintendent, who outlined its chief features. The greatest construction in Albany will be from Lark to Quail Streets, on Madison Avenue, a distance of about 1 mile, where new trackage will be put down in connection with the new pavement which is to be laid this summer, while additional switching facilities will be built west of the Quail Street carhouse.

Construction of approximately 14,000 ft. of new tracks or improvements all told will follow the paving programs in the various municipalities served.

Most of the work will be done by contract. Bids will soon be opened for paving materials and rails, Mr. Murphy said.

A transfer table capable of moving a car from the storage line will be constructed opposite the Quail Street station.

New tracks will be laid for about 2,000 ft. in Rensselaer Street at the New York Central Railroad shops to facilitate handling of cars for employees who formerly were forced to wait the slow movement of cars over the single line from Central Avenue. The new line will provide switching room at each end of Central Avenue.

In addition several new automatic sectionalizing switches will be installed in various sections of the city with the view of relieving traffic congestion.

In Rensselaer, Troy, Watervliet, Green Island, Cohoes and Waterford traction line improvement will follow the intensive paving program to be put into operation there.

In Watervliet a new high-tension switching station will be constructed at a cost of approximately $100,000 to provide even distribution of energy among lines in that section and remove trouble now experienced. Under the present system high-tension current operating Troy and Watervliet lines is conveyed by means of large feeders to the Twenty-fifth Street station, in Watervliet, through Troy from the main plant at Albany.

If trouble develops in the Albany plant it automatically ties up traffic in the outlying towns. Under the new system the power, though coming from Albany by means of the new switching station, can be continued for car operation, despite trouble in Albany.

In addition to this station, feed lines will be constructed in Green Island to care for the growing traffic at the new Ford plant.

New Wage Agreement in Washington

A new agreement was executed on March 26 between the Capital Traction Company and its employees to remain in force until March 30, 1926. This agreement is identical with the agreement which has been in force for the past three years with the exception of the new wage scale for trainmen entering the service after March 30, 1923, given in Sec. 18 and Sec. 26 in reference to the wages and working conditions of the employees other than trainmen. Sec. 18 says:

The rate of wages for conductors and motormen and bus operators in the employ of the company on March 30, 1923, shall be as follows:

First three months' service, 51 cents an hour.

Next nine months' service, 54 cents an hour.

After twelve months' service, 56 cents an hour.

The rate of wages for conductors and motormen and bus operators employed after March 30, 1923, shall be as follows:

First year, 50 cents an hour.

Second year, 52 cents an hour.

Third year, 54 cents an hour.

Fourth year and thereafter, 56 cents an hour.

Motormen and conductors acting as instructors or as one-man car operators shall receive 5 cents an hour in addition to their regular rate of wages.

Sec. 26 says:

The wages and working conditions of shop, substation and other employees, except trainmen and bus operators, now in the company's employ shall remain as at present. Employees in the shop shall receive time and one-half for all overtime and Sunday time, and time and one-half for all holidays if compelled to work.

Platform Employees May Be Appointed Special Policemen

Senator Parton Swift and Assemblyman Nelson W. Cheney of Erie County have introduced a bill in the Legislature at Albany, N. Y., which would amend the railway law to extend to a surface railway operating within or between three or more cities the privilege of having its platform employees appointed special policemen under the jurisdiction of the New York state constabulary.

The law as it stands now allows any steam railway corporation to have any conductor or brakeman appointed a policeman with powers of arrest in cities and villages through which the railway passes.

The members of such a police force would be appointed by the traction company with the approval and authority of the head of the state police and would not be subject to the jurisdiction or dicipline of local municipal authorities of cities through which the railway operates. Compensation for all such special officers would be paid by the railway.

Pittsburgh Receivers Ask Men to Modify Demands

The receivers of the Pittsburgh (Pa.) Railways have sent their reply to their employees who recently presented demands for a wage increase and changes in working conditions. The motormen and conductors are asked to modify their demands or else refer the matter to arbitration according to a clause in the present agreement. The receivers seek a free hand in bringing about further economies in operation. Further it is their contention that a 10-cent fare would be insufficient to meet the proposed increase in the wage scale. The answer of the receivers in part follows:

It is our purpose to present, as relevant to the consideration of proper working conditions and wage rates, the following:

1. Payments now being made for time wherein no service is performed.

2. The desirability of allowing our operating officials to assign such men as they deem competent to the operation of cars other than passenger cars used on the system.

3. There has been a disposition on the part of your committee to attribute to the receivers a commitment to operate one-man cars only over such routes as may be agreed upon after consultation with your committee. In these days of high operating costs it is absolutely essential that the receivers shall feel free to put into operation such one-man cars as receivers may deem proper.

4. The elimination of present limitations on making and putting into effect of schedules and effecting changes when necessary.

5. The consideration of suggestions from officers of operating department relative to a more definite statement of some of the paragraphs of the agreement and the elimination of ambiguity therefrom.

The wage scale committee representing 3,000 motormen and conductors of the Pittsburgh (Pa.) Railways recently petitioned receivers Fagan, George and Tone for a wage scale of 80 cents an hour and an eight-hour day to replace the 60 cents an hour scale and the present day of eight and three-quarter hours. These changes were sought for the year beginning May 1.

The schedule asked for was as follows:

For the first three months of service, from 54 to 74 cents and hour; from 58 to 78 cents for the next nine months and from 60 cents to 80 cents an hour after the first year of service.

At the present rate of 60 cents the pay for the eight and three-quarter-hour day amounts to $5.25, and under the new rate and shortened day the daily pay would be $6.40. The increase amounts to 33⅓ per cent but under the shorter day the increase amounts to 22 per cent in daily pay.

Other changes were sought by the men, including time and a half for all overtime work beyond eight hours instead of time and a half for holidays as is the arrangement now.

The so-called 60 cents-an-hour rate now paid, which is the rate the majority receive, was fixed in 1921 and continued in 1922.

Previous to 1921, when the carmen accepted a 10 cents an hour reduction, the pay was: First three months, 64 cents an hour; next nine months, 68 cents an hour, and after the first year, 70 cents an hour, or 10 cents an hour less in all three groups than is now asked.

Detroit Car Men Seek Twenty per Cent Wage Increase

Following the adoption of a resolution embodying certain requests at a meeting of the platform men employed on the city cars in Detroit, an increase of 20 per cent in salary was asked in a communication presented to Ross Schram, assistant general manager of the Department of Street Railways, and the street railway commission. The men ask that the rate of pay be raised from $5 to $6 per day and that the overtime rate be changed from 75 cents to 90 cents per hour. They ask also that their working hours be kept within a thirteen-hour period.

While no action has been taken by the commission and no information has been given out by the city officials it is believed that the members of the street railway commission oppose the recognition of the street car men's union. An agreement between the city and the organization is asked by the employees. The men base their demand for higher wages on the claim that the present rate does not meet living costs.

The situation is being placed before Frank E. Doremus, Mayor-elect of Detroit, by the street railway commission to determine his stand on the subject of recognition of the union and the increase in pay for the platform men. The new Mayor took up the duties of his office on April 9. It is contended that the union cannot be recognized by the city under the terms of the city charter.

The question arises as to how the increase in wages can be met and whether or not an increase in fares will be necessary if the demands of the men are met. According to the city charter, the operating costs must be met by the income from fares and a sufficient rate must be charged to pay these costs. As pointed out by the city comptroller some time before the last election when the ratification of the $5,000,000 bond issue for extensions to the street railway lines and for the purchase of new cars resulted, if the extensions were to be met out of the income from fares, a 6-cent or higher fare would be necessary.

Some time before the request for an increase for the platform employees of the municipal lines, platform men employed on the Detroit United Railway's interurban lines took similar action in asking for a 20 per cent increase.

Dayton Property Praised

A recent issue of the *Daily Court Reporter*, the only business newspaper published in Dayton, Ohio, calls attention to the work being done by the City Railway and emphasizes what an important factor the railway has been in the development of the city. The splendid relationship existing between the employees and the management is also made a subject of praise. The article urges the co-operation of the people of Dayton in order that the company can continue on a sound stable financial basis. It states that expansion can come only through steadily increasing sums of money and nobody will invest his money unless there is reasonable assurance of the safety of the principal together with a satisfactory return. Further, money will not be attracted for investment in the City Railway unless operations show a satisfactory margin of profit.

Fort Worth Road Will Spend $500,000

The Northern Texas Traction Company, Fort Worth, Tex., announces that negotiations have been completed whereby this company will take over and operate the independent road operated by the Southwestern Baptist Seminary Line. The Seminary line was built at a cost of $34,000, according to officials of the school, and it has been operated in connection with the school plant since its construction. There is an indebtedness of $1,500 against it, the note being held by the Northern Texas Traction Company.

The offer of the Seminary was that it would relinquish its right-of-way and all physical property to the Northern Texas Traction Company in consideration of the cancellation of the $1,500 note and the entering of an agreement that the Northern Texas Traction Company would operate the Seminary line under the regular 7-cent fare as a part of the Fort Worth system.

In agreeing to take over and operate the Seminary line, the Northern Texas Traction Company has also filed notice with the City Commission that it will soon begin work on extensions on the Riverside and Sycamore Heights lines. The question of extensions has been a point at issue in the controversy between the company and the city. The two extensions will represent a cost of more than $500,000, according to George H. Clifford, vice-president and general manager of the company. Money for making the extensions is being raised by the sale of 7 per cent preferred cumulative stock of the company to employees and patrons and an intensive campaign to advertise the sale of this stock has just been started.

Wisconsin Companies Are Expanding

A large number of cities and towns in Wisconsin will benefit by the 1923 expansion program and improvement plans already prepared and estimated by the electric light and power and railway companies operating in their communities, according to returns made in a questionnaire sent to them by the Wisconsin Public Utilities Bureau. The grand total runs into millions of dollars.

The Wisconsin Public Service Corporation, Milwaukee, which is furnishing electric light and power and operates the electric railway services in Green Bay, Oshkosh, Manitowoc, Chilton, Sheboygan, Algoma, Kewanee, Sturgeon Bay and other cities and towns in the Peninsular territory, has under consideration the expenditure of the following sums of money for improvements and additions to its system located in the foregoing cities: Substation equipment $100,000; extension of local rural lines and transmission lines $310,000; power house and outside equipment improvements $55,000; general reconstruction work $100,000. The Menominee (Mich.) & Marinette (Wis.) Light & Traction Company (a subsidiary of the Wisconsin Public Service Corporation) has a program for 1923 that calls for improvements to its electric distribution system amounting to $45,000.

The Wisconsin Traction, Light, Heat & Power Company, Appleton, has a 1923 building plan calling for an expenditure of $200,000 for new and replacement equipment to its electric light and power and railway systems.

The 1923 Wisconsin building program outlined by the L. E. Myers Company for its Wisconsin subsidiary, the Lake Superior District Power Company with headquarters at Ashland, operating in the northern parts of Wisconsin and Michigan indicates that this company intends to expand and enlarge its operations and hold its own as one of the largest operating companies in the State. Improvement plans already prepared call for an expenditure of $700,000 on steam and hydro-electric plant equipment and line improvements. L. N. Boisen, Chicago, is vice-president in charge of operations.

News Notes

Ford May Assist Railway Construction.—It is forecasted that Henry Ford will give financial assistance to the cities of Dearbon, River Rouge and Springwells in the construction of electric railway lines which will be coupled up with extensions to be made to the Detroit Municipal Railway. The increase in the number of employees at the Ford plants is so great that something must be done to provide adequate service for the additional workmen.

Agreement Renewed.—Following a series of conferences, the working agreement of the Trenton & Mercer County Traction Corporation, Trenton, N. J., and Division No. 540, carmen's union, has been adopted for another year with only three slight amendments. Hereafter the men who complete a steady run will receive time and a quarter for operating a tripper. Mail coats will be furnished to the men operating mail cars on the suburban divisions of the company.

Planning Celebration.—Citizens of East San Diego, co-operating with the city trustees, are preparing a carnival April 18 to 23 in celebration of the completion of the reconstruction work of the San Diego (Calif.) Electric Railway on its East San Diego line. This is now the finest street car line in San Diego, and on it on April 3 the company started a peak-hour express service designed to give patrons speedy access to the downtown business district.

Financial and Corporate

Common Dividend Earned Twice

Public Service Corporation Shows Increase in Gross and Net—Railway Revenues Improving

The fourteenth annual report of the Public Service Corporation of New Jersey for the year ended Dec. 31, 1922, shows gross operating revenue of the subsidiary companies amounting to $78,356,963, which is an increase of $3,045,455 over the previous year. The net income after taxes and interest charges was $5,570,239, which was an increase of $1,975,611 over 1921. Payments of preferred dividends amounting to $1,316,839 and common dividends of $1,950,000 were made, the latter totaling 6½ per cent for the year.

The report states that the customer ownership plan of selling the corporation's 8 per cent cumulative preferred stock proved so successful in attracting customers of the operating companies to become investors that it was continued last year with more than satisfactory results. Securities of the Public Service Corporation and its underlying companies are now held by upward of 60,000 individual owners.

Regarding the operations of the railway company, President Thomas N. McCarter, says:

> With gross operating revenues showing an increase and gross operating revenue deductions a decrease, the railway company came through the year 1922 in much better condition, both physically and financially, than had been the case for several years preceding. This notwithstanding the fact that the 2-cent transfer charge fixed by the Board of Public Utility Commissioners, and subsequently set aside by the United States District Court, had diverted traffic in 1921 which was not regained last year. A marked business depression which had continued over from the previous year also made its effect felt, but since May, 1922, there has been a gradual improvement noted in general conditions, as is shown by the increasing numbers of employees in various factories served by the railway lines. The railroad and coal strikes adversely affected industries for a time, with a resultant effect on railway revenue, and an unusually large number of rainy Saturdays and Sundays last summer undoubtedly militated against the railway's receipts attaining a higher level. As it was, the ratio of operating revenue deductions to operating revenue was 78.5 per cent, as against 80.8 per cent in 1921, and the gross income of Public Service Railway, railroad and affiliated companies, after making operating and non-operating revenue deductors, increased $633,209.

Speaking of the jitney situation, Mr. McCarter says that the competition to which the railways have been subjected from jitneys whose operators are permitted to parallel railway lines on the same streets was not diminished during the year, but, on the contrary, it was increased because the jitneurs were allowed to substitute vehicles of much greater carrying capacity than those formerly in use. He states, however, that no additional permits for this class of jitneys were sanctioned by the Board of Public Utility Commissioners during the last year. Nevertheless, this situation is creating a very serious condition of congestion in the main arteries of the larger cities, which, in turn, is causing serious inconvenience to shops, banks and places of business along these thoroughfares, and, if allowed to continue indefinitely, is bound to have a deleterious effect upon real estate values.

It is stated that the transportation department experienced some difficulty in keeping its force of trained men up to the required number.

Expenditures for all purposes by the claim department amounted to $1,016,917, a reduction of $147,007 from the previous year. This represents a saving of 12.63 per cent and brings the percentage of total expenditures to gross passenger receipts to the low figure of 4 per cent.

Details of operating results of the Public Service Railway and its affiliated companies are given in the accompanying table.

PUBLIC SERVICE RAILWAY AND AFFILIATED COMPANIES
Income account for the twelve months ended Dec. 31, 1922

	Public Service Railway Company	Public Service Railroad Company	Other Affiliated Companies	Total
Operating revenues	$26,165,656	$298,419	$1,080,435	$27,544,510
Operating expenses and taxes	19,429,065	241,027	741,643	20,411,735
Amortization charges	1,102,079	.....	107,500	1,209,579
Operating revenue deductions	20,531,144	241,027	849,143	21,621,314
Operating income	5,634,511	57,392	231,292	5,923,195
Non-operating income (exclusive of dividends of affiliated companies)	101,510	632	25,045	127,187
Gross income	5,736,021	58,024	256,337	6,050,382
Income deductions (bond interest, rentals and miscellaneous interest charges)	5,316,194	108,999	49,409	5,474,602
Net income or loss	419,827	*50,975	206,928	575,780
Profit and loss accounts (excluding dividends)	19,906	†200	6,498	26,204
Surplus—before dividends	399,921	*50,775	200,430	549,576
Dividends (all to P. S. Corporation except directors' dividends)	†124,734	.....	124,800	66
Net increase or decrease in surplus	$524,655	*$50,775	$75,630	$549,510

* Deficit. † Credit.

Readjustment Explained

Report of American Railways Shows Net Income of $1,134,520—Conditions of New Financing Explained

The American Railways, Philadelphia, Pa., now known as the American Electric Power Company, reports a net income of $1,134,520 for the fiscal year ended Dec. 31, 1922. As there was a surplus at the beginning of the year of $1,522,192, the total surplus is $2 656,713, from which was deducted $1,086,879, consisting of transfers of dividends accrued on the preferred capital stock to the open account and sundry adjustments. With these charges taken care of, the balance of the surplus at the close of the year was $1,569,833.

Van Horn Ely, president of the company, in the report presented to the stockholders as of Feb. 16, 1923, reviews the work of the directors in planning for financing of some of the subsidiary companies, so that the American Railways might be reimbursed for funds advanced these companies during the period of the war and subsequent thereto, also to place the subsidiary companies in a position so that additional securities in the form of bonds or preferred stock could be issued from time to time, to care for extensions and settlements of the property.

NAME CHANGED FOLLOWING REORGANIZATION

The reorganization and change of name of the company have been referred to previously in the ELECTRIC RAILWAY JOURNAL. Mr. Ely says that the work of the directors resulted in arrangements being perfected with a strong group of bankers which had purchased a bond issue of $7,000,000 and $1,500,000 of 7 per cent preferred stock and the Consolidated Power & Light Company, Huntington, W. Va., and that these same interests cared for the maturing obligation of $2,305,000 of Wilmington & Chester Traction Company bonds, due April 1, 1923.

He also explained that arrangements had been made for funding the accumulated dividends on the preferred stock to the extent of 19¼ per cent to Feb. 15, 1923; for retiring $6,000,000 of collateral trust bonds and $3,000,000 of three-year 7½ per cent notes, retiring and canceling $1,100,000 of the $3,500,000 of five-year 8 per cent notes, and for increasing the authorized first preferred stock from $4,000,000 to $8,000,000 and retiring and canceling the $4,000,000 of second preferred stock.

Mr. Ely says that the board of directors decided that the property of the Bridgeton & Millville Traction Company could not be operated profitably and arranged to retire the bond issue of $500,000, surrender the charter, abandon operation, take up the tracks and liquidate the company. He explains that this was accomplished for the entire line except for the track between Bridgeton and Millville, which was sold to local interests.

He says that during the year the

COMBINED INCOME STATEMENT OF THE SUBSIDIARY AND AFFILIATED COMPANIES OF THE AMERICAN RAILWAYS COMPANY
For the Year Ended Dec. 31, 1922

Operating revenues		$19,342,697
Operating expenses, including depreciation reserves		13,302,912
Net revenue		$6,039,785
Taxes		973,788
Operating income		$5,065,997
Non-operating income		92,512
Gross income		$5,158,509
Interest, deductions, rentals, amortization of discount on funded debt and other charges	$2,663,643	
Sinking fund deductions	68,613	
Total deductions		2,732,256
Income for year		$2,426,253
Less income available for other stockholders		1,365
Income available for the American Railways Company, including interest on bonds, advances, etc		$2,424,887

REPORT OF TREASURER OF AMERICAN RAILWAYS COMPANY
For the Fiscal Year Ended Dec. 31, 1922

Income		
Income from subsidiary companies	$2,410,309	
Miscellaneous income	65,588	
Gross income		$2,475,897
Deductions from Income		
Interest accrued on funded debt	$930,318	
Interest accrued on floating debt	15,279	
Amortization of debt discount and expenses	91,799	
General administrative expenses	249,286	
Depreciation of office furniture and engineering instruments	2,175	
Taxes accrued	40,000	
Discount on securities sold during the year	3,354	
Premium retirement three-year 7½% notes	9,166	
Total deductions		1,341,377
Net Income		$1,134,520
Surplus at the beginning of the year		1,522,193
		$2,656,713
Transfer of dividends accrued on preferred capital stock to open account	$735,000	
Sundry adjustments, mainly cost of the abandonment of the Bridgeton & Millville Traction Co., Bridgeton, N. J.	351,879	
		1,086,879
Balance in surplus at the close of the year		$1,569,834
Preferred stock dividends:		
Accrued in 1920—4.375 per cent	$175,000	
Accrued in 1921—7.0 per cent	280,000	
Accrued in 1922—7.0 per cent	280,000	
Per cent 18.375	$735,000	

maturing three-year $3,000,000 7 per cent note issue was extended for three years at 7½ per cent, and the American Railways Company-National Gas Company collateral trust bonds amounting to $962,000 were extended for a period of five years.

He further explained that the valuations of the properties of the various subsidiaries were progressing under A. L. Drum & Company, and during the year the Public Service Commission of Pennsylvania fixed fair values for the physical properties of the Scranton Railways, Altoona & Logan Valley Electric Railway, the Southern Pennsylvania Traction Company, operating in and about Chester, Pa., and the Chester County Light & Power Company, Chester, Pa.

Interstate Earnings Up

Net Increased $195,928, or 25.51 per Cent in 1922—Freight Traffic Almost Doubled

The gross operating income of the Interstate Public Service Company, Indianapolis, Ind., operating more than 90 miles of electric railway and doing a general light and power business is greater for the year ended Dec. 31, 1922, by $320,257 than the income for the year 1921. This is an increase of 8.09 per cent. Miscellaneous income of the company increased $83,000, or 128.64 per cent. The net earnings show an increase of $195,928, or 25.51 per cent. These facts are all contained in the report of the company for the year, presented to the stockholders at the recent annual meeting.

Harry Reid, president of the company, explained that in 1922 the number of customers served by the company was increased by 4,492. The connected lighting load increased 11.8 per cent and the power load was 10.2 per cent greater at Dec. 31, 1922, than at the close of the year of 1921. Mr. Reid said that the gain in volume of business in the railway department was in some respects even more noteworthy in figures of percentage. The freight tonnage on the interurban railway increased 83 per cent.

Mr. Reid further explained that the company arranged near the close of the year, with the approval of the Public Service Commission of Indiana, to acquire as of Jan. 1, 1923, all property and business of the Indianapolis & Louisville Traction Railway, the Southern Indiana Power Company, the Hydro-Electric Light & Power Company, the Hawkes Electric Company, the Winona Electric Light & Water Company, the Middlebury Electric Company and the Electric Transmission Company of Northern Illinois. The Indianapolis & Louisville Traction Railway owns the interurban line from Seymour south to Sellersburg, a distance of 41 miles.

He also explained briefly for the benefit of the stockholders the extent of the territory served by the other companies which were taken over. As these properties were not taken over by the company until Jan. 1, 1923, the financial results of the merger are not reflected in the report which was presented to the stockholders.

The company issued and sold in 1922 $721,000 in face amount of its prior lien stock and $372,000, par value, of its preferred stock, also $302,000 in principal amount of its first and refunding mortgage 5 per cent gold bonds. The proceeds of these sales were used for the company's corporate purposes. During the year prior lien bonds in principal amount of $123,500 were retired. Mr. Reid explains that the policy of offering the company's prior lien stock to customers, inviting them to become part owners of the company, has resulted in a wider personal interest in its affairs. The company's stockholders increased in number during the fiscal period from 1,009 to 1,980.

STATEMENT OF EARNINGS OF THE INTER STATE PUBLIC SERVICE COMPANY FOR YEAR ENDED DEC. 31, 1922

Gross earnings, including merchandise sales	$4,276,664
Operating expenses (including taxes)	3,305,826
	$970,838
Miscellaneous income	148,082
	$1,118,920
Rental of leased railway property	155,100
Net earnings	$963,820
Interest on funded debt	478,738
	$485,082
General interest and amortization of bond discount	82,238
Available for dividends	$402,844
Dividends paid and accrued: Prior lien stock dividend	65,833
	$337,011
Preferred stock dividend	283,020
Balance carried to surplus	$53,991

The report is particularly interesting in that it contains an appendix of seven pages giving general information about the company and illustrating some of its properties. There is also a map showing the territory served.

Segregation Plan Explained

At the recent annual meeting of the Quebec Railway, Light, Heat & Power Company, Quebec, Canada, protests were lodged against what was termed the segregation of the gas, tramways and power services of the company. In reply E. A. Robert, president, denied that the recent reorganization of the company constituted segregation of the services and said that only one stock issue, that of the holding company, would be listed for trading on the exchange.

In answer to the inquiry of a shareholder, he also said that at present the company was not prepared to make payments on the $3,307,200 issue of income bonds.

The board of directors was re-elected with the addition of J. P. B. Casgrain to replace George E. Amyot, resigned.

Mr. Robert said that he had not been prepared to give a lengthy outline of the plans at the meeting he was addressing.

When he took his position on the board, Mr. Robert said he found that all future bond issues would have had to have the status of second mortgages, which means that they could be marketed only at prohibitive rates. More rolling stock was needed to meet the demands of the city for better service, but there were no funds for this purpose. Even bond interest had to be met by bank loans. It was lack of working capital that caused the reorganization.

Mr. Robert said that the plan was to separate the companies in order to allow earnings from gas, electricity and tramways to be differentiated so that it would be possible to give the city authoritative figures in fixing the rate of return guaranteed by the city. The stock of the operating companies would be held in the treasury of the holding company, the securities of which could in turn be dealt in on the public exchanges.

$835,731 Surplus for Hudson & Manhattan Railroad

The report of Hudson & Manhattan Railway, operating under the Hudson River between New York and New Jersey for the year ended Dec. 31, 1922, shows a surplus of $835,731 after taxes and bond interest, including 5 per cent on adjustment income bonds. Allowing for 1 per cent accumulated interest unpaid at the end of the year on the adjustment bonds and for 5 per cent dividend requirements on the preferred stock, the balance was equivalent to 60 cents a share earned on $39,994,890 outstanding common stock. In the previous year the surplus was $331,824 after taxes and all interest charges. The income account for 1922 compares as follows:

	1922	1921
Oper. revenue	$7,862,419	$7,683,662
Expenses and taxes	4,494,372	4,545,084
Operating income	$3,368,047	$3,138,578
Other income	1,291,356	1,029,192
Non-operating income	264,154	245,715
Total income	$4,923,557	$4,413,485
*Bond interest, etc	2,432,726	2,426,561
Reserve for contingencies	.....	.....
Balance	$2,490,831	$1,986,924
Adj. inc. bond intér.	1,655,100	1,655,100
Surplus	$835,731	$331,824

* Exclusive of interest on adjustment income bonds

Tri-City Railway Wants to Abandon Short Parallel Lines

Abandonment of nearly 3 miles of line in the cities of Rock Island and Moline, Ill., has been asked by the Tri-City Railway of the Illinois Commerce Commission.

The principal abandonment for which permission is sought is that of the Third Avenue line in Moline, where the relocation of the business district has brought about a condition that has resulted in the Third Avenue line running parallel to the Fourth Avenue line and forming, as the traction line holds, a dead appendage.

A like condition exists in Rock Island. There the company proposes to abandon the Fifth Avenue line between Forty-third and Forty-sixth Streets and the Seventeenth Street tracks between Second and Seventh Avenues.

Detroit's Plans for Bond Proceeds

At the last Detroit election the Board of Street Railway Commissioners by popular vote was authorized to issue $5,000,000 to extend the system, but under the present limitation of 2 per cent of the assessed valuation which a city in Michigan can spend for public utilities not all of this money is at present available. With the new property assessment it is expected that a greater part of this sum can be spent before long.

It is expected that the first $1,400,000 will be used to complete the payment of $2,400,000 for the 200 Peter Witt cars ordered last August by the Municipal Railway. No definite plans have been made for further expenditure, but some will undoubtedly go for track extensions. Some 40 miles have been projected in the building program, and probably hearings will be held when the funds become available to determine which of these track extensions is the most important.

City Administration Seeks to Delay B.R.T. Reorganization

The city administration of New York, through Corporation Counsel George P. Nicholson, objected to the proposed Brooklyn Rapid Transit reorganization at the hearing held on April 10 by the Transit Commission. He said the plan should await action by the Legislature on the transit bills, and expressed the belief that the present Transit Commission probably would be abolished.

George McAneny, chairman of the commission, said the commission was not disposed to take into consideration in making its decisions the present condition of current politics. The hearing was adjourned until April 20, after Mr. Nicholson and his assistants had protested against the plan generally and specifically.

Mr. McAneny said in part:

> Mr. Nicholson, the commission is not disposed to take into account the condition of current politics in determining its calendars or its course of action here. This is a matter of very large public moment, and will go through lengthy discussion, from time to time, on its several phases. The commission will continue to function, as the law requires it to function, to act upon matters that come before it as rapidly as it may act after they are presented. Therefore it must deny your request for an adjournment.
>
> I might add, as to the public importance of this matter, that these reorganizations, designed to put these great properties upon their feet, to permit them to go ahead with the resumption of uninterrupted service and the expansion of their facilities, should, in my judgment and the judgment of the commission, never be delayed.
>
> The proposed reorganization of the B. R. T. properties will take them out of receiverships and will put the B. R. T. companies, we assume, in a position similar to that in which the Interborough Company has found itself since its reorganization.

Authority Sought to Issue Securities Under Maine Reorganization

A hearing was held recently before the Public Utilities Commission of Maine on petition of the York Utilities Company for authority to issue stocks and bonds as the successor company to the Atlantic Shore Line Railway. Foreclosure and sale, by decree of the United States District Court, enabled the committee, representing the bondholders, to reorganize and try to place the property on a sound basis. The new corporation seeks authority to create $2,393,500 of capital stock, and to issue $482,300 in common and $179,100 in preferred at this time. This petition seeks the right to acquire rights, privileges, properties and franchises of the system. It is proposed to finance the project as follows:

To issue to the Alfred Light & Power Company $50,000 in preferred stock, $75,000 in common, $75,000 in first mortgage 5 per cent bonds and $50,000 in second mortgage 5 per cent bonds.

To issue to the Sanford & Cape Porpoise Railway $10,000 in common stock, $81,000 in first mortgage 5 per cent bonds and $54,000 in second mortgage bonds.

To issue to the holders of first mortgage bonds of the Atlantic Shore Line Railway $36,000 in preferred stock, a like amount of common, $24,000 in first mortgage 5 per cent bonds and a like amount in second mortgage 5 per cent bonds.

To issue to holders of the consolidated mortgage bonds of the Atlantic $289,200 first mortgage 5 per cent bonds, and $216,900 in second mortgage 5 per cent bonds, $93,100 in preferred stock and $39,900 in common stock.

Auction Sales in New York.—At the public auction rooms in New York there were no sales of electric railway securities this week.

Operations to Cease.—According to a recent decision of Judge Peters in the United States District Court the receiver of the Portsmouth, Dover & York Street Railway, Dover, N. H., has been authorized to discontinue further operation of the property.

Net Increases.—The net balance of the Lehigh Valley Transit Company, Allentown, Pa., increased $25,812 in 1922 after all charges. The gain was remarkable in view of a decrease of $177,517 in the combined gross business. During the year 66,996,655 passengers were carried. The report shows that tne property of the Easton Transit Company, a subsidiary, had been leased during the year.

Park to Be Sold to Satisfy Judgment.—Notice of sale of a portion of the assets of the Southwestern (Tex.) Traction Company, which operates an interurban line between Temple and Belton, Tex., a distance of 10 miles, has been posted at Temple. The property to be sold consists of a tract of 37.64 acres of land midway between Temple and Belton now used as a pleasure park. The sale is to be made to satisfy a judgment of $6,000.

Surplus Earnings Increase $350,000.—The gross earnings of the United Light & Railways Company, Grand Rapids, Mich., for the twelve months ended Feb. 28, 1923, are $12,029,087 against $11,235,195 for the same period ended February, 1922. The surplus earnings available for depreciation, debt discount and common stock dividends amounted to $1,215,476 compared with $857,994 for the twelve months ended Feb. 28, 1922.

Interurban Elects New Director.—At the annual meeting of the stockholders of the Washington, Baltimore & Annapolis Electric Railroad, Washington, D. C., C. M. Mason, New York, was elected a director to fill the vacancy caused by the death of James A. Hemenway. Other directors and former officers were re-elected. The company reports for the year ended Dec. 31, 1922, gross earnings of $2,433,066, as compared with $2,512,540 the previous year. The income after providing for taxes and charges was $230,152, against $230,531 in 1921.

Traffic and Transportation

Service Order Issued

Schenectady Railway Directed by Public Service Commission to Carry Out Service Changes

Orders have been issued by the Public Service Commission directing improvement of the Schenectady (N. Y.) Railway's equipment and service, and calling for eighteen new cars and an investigation into the practicability of establishing supplementary bus service in Schenectady. The orders make mandatory suggestions made more than a month ago.

The commission directed that six new interurban cars be obtained for use between Schenectady, Albany, Troy and Saratoga, and twelve new double-truck cars for Schenectady. The new cars must be in operation by Sept. 1.

The company, however, has anticipated the order by announcing it would order twelve cars for Schenectady, and establish supplementary bus line service for sections not served adequately by the company's trolley lines.

In addition to requiring eighteen new cars, the commission directed the company to obtain at least one double-truck snow plow and one ice chopping machine.

Three other important orders were issued by the commission, with the requirement that the company reply within a month whether it will carry them out. These are that either a new substation be constructed at the McClelland Street carhouse or at State and Elbert Streets with adequate transformer apparatus, or that an increase be made in the size of the units at the Dock Street station; that during the morning and evening rush hours all interurban cars going to and from the General Electric Company's plant be routed via Broadway and Edison Street; and that during the morning rush hours most of the State Street and Mount Pleasant cars be operated inbound via Veeder Avenue, Smith Street, Broadway, Edison Avenue and River Road, reversing the operation during the evening rush hours.

The company also is directed to comply "forthwith" with fifteen recommendations for improvement in operating and general service conditions as follows:

That car overhaul be made on a proper time or mileage basis.

That an effort be made to secure a standardization of equipment.

That the operation of cars with flat wheels for more than one round trip, except in extreme cases of emergency, be strictly prohibited.

That the force employed in car cleaning be increased, and the methods employed be improved.

That a system of double berth operation be installed in the business district.

That passenger stops within the city of Schenectady be reduced to the smallest number consistent with convenience of riders generally and with the greatest benefit to the transportation system as a whole, such reduction to be submitted to the commission for approval.

That no cars be turned back before reaching signed destination, except in cases now provided by its rules.

That the changing of car signs before reaching destination be strictly prohibited, except in cases provided for by rule.

That methods be employed to eliminate the practice of crews of operators running by passengers waiting for car, except in cases now provided for by rule.

That all cars not disabled, returning to car house and carrying sign "car house" carry passengers while doing so, passengers on board to be notified of the destination of the car.

Buses for Schenectady

The Schenectady (N. Y.) Railway is to operate passenger carrying automobile buses, according to an announcement made on April 7 by James F. Hamilton, president of the company. The buses will be used in districts which are not now sufficiently served by trolley cars.

The number of buses to be purchased and the routes to be followed are details which Mr. Hamilton would not disclose at this time. However, it is probable a bus line will be operated between the General Electric plant and the Mount Pleasant section. This route was suggested by the Public Service Commission in connection with its report of a survey of conditions in Schenectady.

It is probable buses will also be operated in Erie Boulevard. Deliveries of buses for use in Schenectady will probably not be made for sixty days, Mr. Hamilton stated.

Another Weekly Pass on Trial

The Seattle & Rainier Valley Railway of Seattle, Wash., has placed in effect the weekly pass system, permitting a passenger to ride any number of times during a week for $1.25, with the pass interchangeable. Walter M. Brown, general manager of the company, states that a very careful analysis of the average amount of service obtainable to each passholder will be made, and if it develops later that it is possible to reduce the purchase price of the pass, the company plans to do so. He stated that the company did not expect to increase its earnings, but that it did expect to increase its service to the line's patrons. Mr. Brown states that an average of 22.7 rides a week is given as the probable result, which would mean 5½-cents transportation. In Tacoma, the average number of rides is twenty-six a week, his figures show.

In the meantime, the State Department of Public Works has conducted a hearing on the application of forty-seven residents of the Rainier Valley district for a 5-cent fare on the company's lines. The company's chief defense was that the average haul on its lines is 6 miles, against 3.7 miles on the Seattle municipal lines, and that a reduction in fare from 8⅓ cents is not possible.

Railways Answer Board

Los Angeles Lines Offer Plans for Improvements Costing $6,000,000 to Better Service

The managements of the two railway systems at Los Angeles, Cal., on April 5 filed an answer to the report of the Board of Public Utilities of the city on the transportation problem of the city. The companies agree to make extensive improvements, involving the extension of six lines, and also to construct four new lines and give temporary bus service on twelve other lines. Delay is, however, requested on nine, while the companies refuse to make the changes suggested by the board on eight lines.

The estimated cost of the improvements that the rail lines agree to carry out is $6,000,000. The companies urge that the two important questions of universal transfers and extension of the Los Angeles Railway lines into the territory in Hollywood now exclusively served by the Pacific Electric Lines be delayed until it is decided whether the two lines are to be unified. This question is now being made a matter of study by Richard Sachse, former chief engineer of the California State Railroad Commission.

The board's report, referred to at length elsewhere in this issue, included forty-one suggested improvements. In some cases where the board recommended motor bus "feeder" lines be installed, the railway systems refused to accept the board's report, claiming that the business to be had did not warrant such bus lines, and in other cases certain unimproved streets made bus service impossible.

The railway managements state that in their judgment there will not be any reasons for an increase in fares in Los Angeles unless buses are awarded franchises to run on streets parallel to existing railway lines.

The railways recommend that the City Council appropriate $3,000 to send the chief engineer of the Board of Public Utilities and a member of the board to Eastern cities to study motor-bus and electric railway conditions.

Two of the commissioners on the board who form a majority have refused to accept the railway companies' plans. They take the stand that the railways refuse immediately to meet the demand of the commission on the points set forth in the board's report and recommendations.

Commissioner Bogardus claims the railways have refused to accept the full program demanded by the board, and that other means must be found to obtain the transportation needed. This may contemplate bringing in the bus.

In regard to the proposed subway system whereby it was proposed to use Pershing Square, the city's central park, as an underground subway passenger terminal, the city attorney states that the present city charter gives the City Council power to authorize railway lines to build subways under

city property, but does not permit them to authorize the construction of underground passenger stations; therefore, the Pacific Electric's new $20,500,000 subway system, must be authorized by an amendment to the city charter. In consequence the necessary amendment may be placed upon the ballot at the May 1 primaries or the June 5 city election.

The People's Motor Bus Company is conducting a very active campaign in behalf of two petitions certified and placed on the ballot for May 1 election. One of these repeals the existing "jitney" bus ordinance. This measure prohibits bus operation in the congested downtown district. The other petition would compel the City Council to give a franchise to the motorbus company to operate a motorbus system on 61 miles of streets, some of the routes paralleling the railway lines.

Some of the members of the City Council contend the rail lines should have an opportunity to work out their program, but the City Council has not as yet taken any action on the board's report.

The City Council does not plan to take any action on the motorbus question until after the election of May 1, when the voters will express themselves on the subject.

More Attractive Service Proposed for Elevated

By direction of the new board of directors, Frank Hedley, president of the Interborough Rapid Transit Company, New York, has been considering, in conference with the Transit Commission, ways and means to improve and make more attractive the service to the public furnished by the elevated lines. A careful survey has indicated that a substantial number of people would be glad to take advantage of the greater comfort and the open air riding on the elevated roads, especially on express trains, if the elevated express service were made an all-day instead of a "part time" service during rush hours only.

The board at its meeting on April 10 therefore authorized changes in the train operations which, it is believed, should lead to a greater use of the elevated lines by the public, thereby relieving congestion elsewhere pending the opening of new subways.

The new schedules will call for an increase of 428 trains a day, and the major part of this will become effective on Monday, April 16.

Not only will the number of trains be greatly increased, but the intervals of time between trains will be greatly reduced. The time-tables are in course of preparation and the resultant lessening of the intervals will be announced later.

These changes will involve the expenditure of more than $2,000,000. While the added service will greatly increase the daily operating expenses, it is hoped that the public will help the company in its efforts to give better service and justify these expenditures by traveling to a greater extent upon the elevated lines in the open air and sunlight.

Electrification Rumors Plentiful

Several Texas Roads Reported to Be Contemplating Adoption of Electricity as Motive Power

Electrification of the St. Louis Southwestern (Cotton Belt) between Dallas and Greenville, Tex., is being discussed. Willingness of the railroad to undertake electrification was expressed by Daniel Upthegrove, president of the Cotton Belt. He indicated that the Cotton Belt might undertake the work of electrifying its line, or that a proposition might be considered under which some private company would undertake to electrify the line and operate it.

The distance between Dallas and Greenville is slightly more than 50 miles, and it is declared that the line can be electrified and used for passenger and light freight and express traffic, while steam trains use the line for hauling heavy freight.

C. W. Hobson, Dallas, Southwestern representative of the General Electric Company, declared the electrification of the Dallas-Greenville line of the Cotton Belt is entirely feasible. He is said to have indicated that his company would be willing to open negotiations with the Cotton Belt officials looking to the carrying out of a plan something like that entered into between the company and the Missouri, Kansas & Texas road for the electrification of the line of the Katy from Dallas to Denton.

Electrification of the Dallas-Greenville branch of the Missouri-Kansas-Texas Railway is being considered by Katy officials, according to W. M. Whitenton, Dallas, assistant chief operating officer of the Texas Katy lines.

Electrification of the Trinity & Brazos River Railway's line from Cleburne to Hillsboro, Tex., is being urged upon the company. The distance is about 30 miles. Cleburne now has an interurban to Fort Worth and Hillsboro is on a line out of Dallas. The connection between Cleburne and Hillsboro would prove a valuable line, it is declared.

Plans are said to be under way for the electrification of the Atoka-Oklahoma City Division of the Missouri-Kansas-Texas Railway's lines. Official confirmation of the report is lacking, but it is regarded as certain that the electrification program will be undertaken during the summer. The Atoka-Oklahoma City Division embraces the line between these two towns and is 100 miles in length. Construction of a line from Atoka to Denison, Tex., would also be included in the electrification program, thus affording a connection with the Texas lines of the Texas Electric Railway (the consolidated Strickland lines). This would afford an electric line from Waco, Tex., to Oklahoma City, a distance of considerably more than 300 miles.

No More Trolleys in Newburgh

The Newburgh (N. Y.) Public Service Corporation has absorbed the Hudson Transit Corporation. The former corporation is headed by Benjamin B. Odell, ex-Governor of New York State. The latter concern was controlled by Didsbury, Aber & Didsbury, Walden. With the Hudson Transit Corporation, the Newburgh Public Service Corporation acquired an additional eleven buses, giving it a total of twenty-five buses, all in operation. Fourteen are Fifth Avenue Coach Company buses; eight Mack buses and three Dodge Brothers buses. The two latter came in with the Hudson Transit Corporation purchase. Daniel G. Aber has been retained as manager of the Newburgh Public Service Corporation.

The Hudson Transit Corporation had been an inland passenger carrier in Orange County, and enjoyed numerous operating privileges, one giving the right to the company to run south from Newburgh to Nyack. The buying concern is keeping alive all of the franchises, and plans to develop them even further inland during the coming summer.

On March 31 the three remaining trolley cars were taken off the streets of Newburgh, making it exclusively a bus city. According to officials of the Newburgh Public Service Corporation, 33 per cent more persons have ridden in buses during the past winter when they were put on routes, than rode in trolley cars during the similar period in 1922. A bus terminal 200 ft. x 25 ft. is now in course of construction by the Newburgh bus concern. Five additional buses have been ordered from the Fifth Avenue Coach Company.

Service Greatly Improved in Des Moines

Another good illustration of the consistent efforts which the Des Moines (Ia.) City Railway is making to provide satisfactory service to its patrons is the announcement that the company will shortly start crosstown service. Two lines will be linked into the crosstown service within a very short time and it is planned to extend the system gradually over a majority of the lines in the city. For some time the congestion in the loop district has been a decided traffic problem and this has been particularly true during such emergencies as parades. At such a time it has been practically impossible to restore service to its normal state short of several hours. Des Moines tried crosstown service on one or two lines several years ago but it was abandoned.

Concrete evidence that the city is appreciating the efforts for good service which the company is making is contained in a highly complimentary editorial which appeared in the Des Moines *Daily Capital* recently. The editorial compared the experiences of Des Moines and Seattle in dealing with their railway problems, much to the disfavor of the Washington city which took over the car lines.

Another Ohio Railway Starts Interurban Bus Service

Bus operation by the Indiana, Columbus & Eastern Traction Company in Ohio, held in abeyance pending action by the State Legislature on the motor-bus licensing and regulatory bill, was started between Columbus and Zanesville on April 8, following adoption of the bus measure a few days before. The Columbus-Zanesville bus service supplements the regular electric railway service. It is the forerunner of other bus lines in Ohio to follow the regular routes of the electric railway and to be operated between the periods at which cars on the traction line leave the terminal.

Copies of the new schedule have been filed with the Public Utilities Commission, together with tariff rates, as required by the new state law. The bus service is under the general management of R. L. Jacobs, Springfield, who has been relieved from duty as dispatcher in the Springfield offices of the traction company.

The bus company, known as the Zanesville & Dayton Motorbus Company, was organized several weeks ago, as outlined in a previous number of the ELECTRIC RAILWAY JOURNAL, for the expressed purpose of helping the traction company in its campaign against outside bus competition which had been making extensive inroads into its revenue. Terminals of the traction line are used as stations in the various cities by the buses.

Conductor Tenders Dinner to Co-employees of Carhouse

At Louisville, Ky., on March 22, an unusual event took place. One of the conductors at the Market Street carhouse, C. W. Wingate, gave a dinner to the seventy-odd employees of the carhouse and to all of the officials of the transportation department.

There are nine carhouses in Louisville and for the past few years President J. P. Barnes has been giving a dinner to men at the carhouse operating the greatest number of car-miles per accident during the preceding month. When a carhouse won the accident elimination contest two months in succession the ladies were invited to attend and a special dinner and special entertainment were provided.

The Market Street carhouse won the contest for the month of January. At the dinner which was given early in February Conductor Wingate announced that his pride in his carhouse and his interest in the welfare of the company were such that if his carhouse won the contest for the month of February, he would give a dinner to all the employees of his carhouse, at his own expense, in addition to the dinner President Barnes gave to the employees and their ladies.

Mr. Wingate's carhouse came in an easy winner for the month of February and President Barnes was host to the men and their ladies on March 19. On March 22, Conductor Wingate gave his dinner at the Market Street carhouse. He had as his guests seventy trainmen and carhouse employees and twenty-five or thirty officials and employees of the transportation department.

Director of Safety Neil W. Funk acted as toastmaster for the dinner and in addition to addresses by the various transportation department officials Conductor Wingate made a very able address on the necessity of furthering the efforts of the company in accident elimination.

Suburban Fare Increased at Dallas

The Dallas (Tex.) Railway has increased fares from the city of Dallas into Highland Park and from Highland Park into the city of Dallas. Highland Park is a suburb adjoining the city of Dallas on the North. It has a separate municipal government from that of Dallas.

The fare to and from Highland Park will be 8 cents, while the rate in the city of Dallas remains 6 cents. The increase in fares was approved by the City Council of Highland Park after an agreement with officials of the company that the company would bear its share of paving and make other specified improvements. The matter of paving had been in litigation between Highland Park and the company.

Passengers boarding cars in Dallas pay cash fare of 6 cents or present transfers. After crossing the Katy Railroad on Knox Street (Highland Park city limits) conductors announce that all passengers leaving cars after passing into Highland Park shall deposit 2 cents each in the fare box. Passengers boarding cars after crossing the Katy Railroad pay 6 cents. To these passengers transfers are issued which they surrender when leaving cars, as an indication that they are passengers who boarded cars of the company within the city limits of Highland Park.

Children under twelve years of age boarding cars in the city of Dallas pay 3 cents and deposit 1 cent on leaving cars in Highland Park.

Day students attending S. M. U. pay regular fare in the city of Dallas, and on leaving cars at S. M. U. (north of Mocking Bird Lane) show special students' cards. No additional fare is collected on presentation of this card.

Passengers boarding cars in Highland Park, coming to the city of Dallas, deposit 8 cents in the fare box. Passengers, however, who do not intend to come to the city of Dallas are permitted to ride for 6 cents.

Students boarding cars at S. M. U. (north of Mocking Bird Lane) are permitted to ride on 6-cent fare or students' tickets upon presentation of students' cards.

Children under twelve years of age boarding cars in Highland Park, coming to the city of Dallas, pay 4 cents. Children under twelve years of age who do not intend to come to the city of Dallas are permitted to ride for 3 cents.

Service and Number of Runs Increased

A new grouping of cars of the various divisions has been completed by the Los Angeles (Calif.) Railway, so that all cars of a line run out of the same division, and are under the direction of one division superintendent. Heretofore, most of the lines have been divided between two divisions with a resulting division of responsibility over the crews by division superintendents. New schedules on all lines were prepared and a general choice of runs according to seniority was conducted.

The rearrangement has increased service and has enabled the schedule department to build an increased number of runs. By placing all cars of a line at one division, it has been possible to join morning and evening trippers and increase the midday service, so as to make an additional number of desirable runs. Trainmen are given the option of working six or seven days a week.

The new plan of operation was put into effect by the company on April 1.

Will Start Bus Service.—Southern Indiana Gas & Electric Company, Evansville, Ind., will operate a bus service between Dixon, Ky., and Henderson.

Bus to Replace Railway.—The Richmond-Fairfield Railroad, operating from Richmond, Va., through Fair Oaks, Seven Pines and to the National Cemetery, has announced that on the completion of the Nine Mile Road concrete paving it will substitute buses.

"Technology Review" Reprints "Journal" Article.—The *Technology Review* reprinted in its April number the article and photograph of J. P. Barnes, recently published in the ELECTRIC RAILWAY JOURNAL. The story was published in the JOURNAL on the occasion of Mr. Barnes' election as head of the Central Electric Railway Association.

San Antonio Would Bar One-Man Cars.—The City Council of San Antonio, Tex., has adopted an ordinance barring the use of one-man cars in that city. Passage of the ordinance brought a protest from W. C. Tuttle, president of the San Antonio Public Service Company, who declared that enforcement of the ordinance would bring about a condition that would demand an increase in fares, as his company could not operate double crew cars and meet operating costs under the rate.

Accident Warnings in Davenport.—Coincident with the "safety week" to be undertaken in Davenport Ia., under the auspices of the good roads committee of the Chamber of Commerce, the Davenport police department and traffic squads, the Tri-City Railway is launching its own safety campaign. Large posters of warning to pedestrians and patrons of the lines are being installed in all the cars on the Davenport lines calling the attention of all who ride to the necessity of being continuously alert to guard against accidents. The warning signs will be changed weekly.

Personal Items

Mr. Wales at Winnipeg

Engineer of Wide Experience Appointed to Important Post with Winnipeg Electric Railway

M. W. Wales has been appointed engineer of maintenance of way and structures for the Winnipeg (Man.) Electric Railway in succession to S. Wilkins, who resigned last November and is now in Los Angeles, Calif.

Mr. Wales is a technical graduate in naval architecture, marine and civil engineering, with fifteen years of practical experience. From June, 1907, until September, 1909, he was employed by the Pennsylvania Tunnel & Terminal Railway, New York City, as instrument man on the construction of the East River tunnels and Sunny Side yard.



M. W. Wales

In this capacity he had charge of survey parties on tunnel excavation, concrete lining, track layout, etc.

After a year of private engineering practice in New York City, Mr. Wales, in 1910, was appointed engineer inspector of the Board of Water Supply, New York City, on the construction of Kensico dam and appurtenances. This work included the construction of 8 miles of relocated state highway, three reinforced concrete bridges, one of which was a five-span arch-design, 1,000 ft. between abutments. The dam proper was a cyclopean masonry structure with cut-stone and precast concrete block facings, with a three-span cut-stone arch bridge over spillway, and all roadways, walks, etc., paved with asphalt blocks.

From April, 1917, to August, 1918, he was engaged on naval architecture for the Continental Shipbuilding Corporation, New York City, and from August, 1918, until his connection with the Winnipeg Electric Railway he was employed by Fraser-Brace, Ltd., contractors, Montreal, first as engineer and assistant superintendent in charge of construction on a hydro-electric development for Price Brothers, Ltd., at Chicoutimi, Que., and later as construction engineer on the Great Falls development built for the Manitoba Power Company just outside Winnipeg. In connection with the Great Falls development, Mr. Wales had charge of the layout and construction of the transmission tie line and had charge of all the form and concrete work, reinforcing steel, etc., for the power house and dam.

J. H. Klinck to Supervise Westinghouse Production

J. H. Klinck has been appointed assistant supervisor of production of the Westinghouse Electric & Manufacturing Company. After completing a course in electrical engineering at Cornell, Mr. Klinck took up post-graduate work at the same institution, but before he had finished the course he received an appointment as instructor in electrical engineering at Lehigh University, where he continued his post-graduate studies. Some years later, as electrical engineer for the Lehigh Valley Railroad, he was closely associated with the installation of power, heating and lighting equipment in the various repair shops of that road.

In 1904 Mr. Klinck became connected with the Westinghouse Electric & Manufacturing Company in the industrial and power sales department as commercial engineer on railway shop equipment, with headquarters at East Pittsburgh. In 1910 he was transferred to the Atlanta sales district and was located first at Charlotte, N. C., and later at Birmingham, Ala. He was manager of the industrial and power division for the Atlanta territory for several years.

In 1918 he entered the army as a major in the construction division. He served as chief of the procurement section of the construction division, acting chairman of the board of claims of that division, and as one of the army representatives on the War Industries Board, being chairman of the army commodity committee on steam and electric equipment. Upon his discharge from the army in 1920, Mr. Klinck returned to the employ of the Westinghouse Electric & Manufacturing Company at East Pittsburgh.

S. M. Quinn has been appointed chief engineer of the Batavia power plant of the Chicago, Aurora & Elgin Railroad. Mr. Quinn, in this capacity, succeeded J. F. Martin, who has resigned to accept a position in the coal industry. The new engineer for the Chicago, Aurora & Elgin property goes from the Ford Motor Company at Detroit, Mich., where he performed the duties of engineer. This new appointment became effective on April 1, 1923.

Mr. Simonds in New York

Vice-President and General Manager at Dubuque Joins Electric Bond & Share Organization

O. H. Simonds has resigned as vice-president and general manager of the Dubuque (Iowa) Electric Company to accept an important position with the Electric Bond & Share Company, New York, one of the largest owners and operators of utility properties in the United States. The announcement was made at the local electric company's office on April 12.

Recently Mr. Simonds was elected vice-president and director of the Dubuque Electric Company. He has long been called the "Sphinx" by Dubuquers who know him. He does things for the interest of the company and the betterment of civic interests and says nothing. That's the reason for the sobriquet. When his activities are discovered he still maintains a discreet silence and lets actions and figures speak for themselves. His efforts to hide his light of genius under a bushel fail, however, to keep it concealed.



O. H. Simonds

Mr. Simonds, unlike many other public utility executives, takes an active part in civic affairs. He has been a member of the board of governors of the Chamber of Commerce for two years and has worked strenuously for the acquisition of new industries for the city.

Mr. Simonds was born in Duluth, Minn. He was graduated with the degree of mechanical engineer from Cornell University in 1908. For seven years thereafter he was employed in various capacities with the General Electric Company, spending the last four years of that period in the lighting and railway department of the General Electric Company's Chicago office. He then resigned to enter the engineering department of Elston, Clifford & Company, Chicago, and later became general manager of the Vicksburg Light & Traction Company, Vicksburg, Miss.

While he was in that state he served two years as president of the Mississippi Section of the National Electric Light Association.

Mr. Simonds was the first president

of the Mid-West division, N. E. L. A., comprising the states of Iowa, Missouri, Nebraska and Kansas. He served for two terms as president. He was also largely instrumental in the formation of the Iowa Committee on Public Utility Information.

He has served the Iowa Section, N. E. L. A., as president and is on the executive committee of the Iowa Electric Railway Association at the present time.

If Mr. Simonds has a hobby it is Union Park, a sylvan retreat in the hills of Dubuque County. In addition to his myriad duties he has had time to supervise the creation of this natural park, open to the autoist as well as electric railway patron, and has transformed a losing venture into a revenue producer.

Mr. Simonds will be located in New York in offices immediately adjacent to the building occupied by the Albert Emanuel Company, which recently took over control of the Dubuque Electric Company, and will thereby be able to assist materially by his advice and counsel in the completion of plans for the improvement of the local company which he had so much at heart.

His successor at Dubuque will be Thomas Parker, who comes from the Emporia, Kan., division of the Kansas Power Company, owned and controlled by the Albert Emanuel Company. Mr. Parker and Mr. Simonds are friends of long standing and associated in the activities of the Mid-West section of the National Electric Light Association. Mr. Parker is equipped technically and fitted temperamentally to continue in Dubuque the policies that have developed the Kansas properties.

New Officers Elected

As a result of the purchase by the North American Company some time ago of the Milwaukee Northern Railway, new officers for the purchased property have been elected. They are as follows: President, John I. Beggs; first vice-president, S. B. Way; second vice-president and general manager, F. W. Walker; assistant general manager, John St. John; master mechanic, Frank T. Kittsley; purchasing agent, Fred V. Benz; claim agent, A. Kordich.

Edward M. Merrill in Cincinnati

Establishment of a department of schedules in charge of Edward M. Merrill, formerly of the Philadelphia (Pa.) Rapid Transit Company, has been announced by Walter Draper, vice-president of the Cincinnati (Ohio) Traction Company. Mr. Merrill until April 1 was assistant superintendent of transportation of the Philadelphia Rapid Transit Company. He was graduated from the Massachusetts Institute of Technology in 1909. For several years Mr. Merrill was engaged with the Union Pacific Railroad as a civil engineer and then entered the employ of the Puget Sound Traction, Light & Power Company, with which company he remained from 1914 to 1918. He next became connected with the Milwaukee Electric Railway & Light Company with the title of assistant superintendent of transportation. He resigned from the company at Milwaukee to go to Philadelphia. Mr. Draper said that the department of which Mr. Merrill will be in charge was organized for the purpose of working out a complete schedule of operations of the various routes.

W. R. Dunham Made Executive Engineer of Detroit Municipal Railway

W. R. Dunham, Jr., has been appointed executive engineer for the Department of Street Railways, Detroit, Mich., reporting to the Street Railway Commission and the general manager of the municipal railway. Mr. Dunham was connected with the Department of Street Railways at Detroit in connection with the building of the new lines in 1921. In April, 1922, he was engaged by the International Steel Tie Company to do special work as assigned. In November, 1922, he was called to Detroit by the Department of Street Railways in a consulting capacity in connection with arbitration proceedings between the city and the Detroit United Railway in the matter of the rate case to determine a base and rate for the use of the city's tracks by the D. U. R. interurban passenger and freight cars.



W. R. Dunham, Jr.

Mr. Dunham has been engaged in engineering work in the electric railway field for more than thirty years. His first connection with the industry was as a student in an engineering office in Providence, R. I., where work was done for the Union Railroad, a horse railway of that city. When the railway organized its own engineering department Mr. Dunham joined it, and as the system developed he was rapidly promoted. When, in 1893, the Union Railroad was merged in the United Traction & Electric Company he became principal assistant in track matters.

In 1902, when the United Gas Improvement Company took over the Providence property and formed the Rhode Island Company, Mr. Dunham's duties were radically changed for a time. Due to his familiarity with the layout of the property he was assigned to develop a system of transfers, for which purpose a new department was formed. However, two years later he went back with the engineering department in charge of all civil engineering matters.

In 1906 Mr. Dunham went to New Haven to become assistant engineer in the maintenance-of-way department of the Consolidated Railway (now the Connecticut Company), becoming engineer of maintenance-of-way in July, 1914. In this position he did most valuable construction, maintenance and valuation work.

V. W. Burley Becomes General Superintendent

Announcement has just been made of the promotion of V. W. Burley to the position of general superintendent of the Binghamton (N. Y.) Railway effective on April 1.

For the past thirteen years Mr. Burley has been connected with the Binghamton Railway, having first entered its employ as a conductor in 1910. Prior to that he had been with the Pennsylvania Railroad for ten years. At Binghamton Mr. Burley has been conductor, inspector, dispatcher and claim agent. In 1917 he became superintendent of transportation, and he has held that position until his present promotion.

Thomas Larimer has succeeded Otis McCormick as secretary and auditor of the Southern Cambria Railway, Johnstown, Pa.

Garfield Scott has succeeded C. R. Warden as general counsel of the United Gas Improvement Company, Philadelphia, Pa.

Amzi Smith has assumed the position of vice-president of the Johnston City (Tenn.) Traction Corporation, in addition to his duties as general manager.

Lewis A. Keen has been added as vice-president to the Ponce (Porto Rico) Electric Company. In this capacity he will work along with Marcey L. Sperry, who is also a vice-president of that property.

C. B. Brownell has succeeded Best Shaw as engineer of the power Station of the Burlington (Vt.) Traction Company. The new engineer of overhead construction is Frank Warner, who succeeds N. Young.

G. L. Enfors has succeeded M. T. Montgomery as superintendent of the Porto Rico Railway, Light & Power Company, San Juan, Porto Rico. C. B. Castro has succeeded A. Jimeney as purchasing agent of that company.

Sam Smith is now engineer of overhead construction of the Ephrata & Lebanon Street Railway and the Ephrata & Lebanon Traction Company, which operates the former railway property. Mr. Smith's office is located in Reistville, Pa. George E. Carson was

formerly manager of overhead construction of both properties.

J. L. Alexander, manager of the Keokuk (Iowa) Electric Company, will be transferred to the Haverhill (Mass.) Gas & Electric Company as manager. Mr. Alexander has been in Keokuk three years.

Miss Florence A. Snyder has been appointed auditor of the Marion & Bluffton Traction Company, Bluffton, Ind. The appointment became effective on April 1. Miss Snyder was formerly cashier and bookkeeper of the company.

Herbert B. Reynolds, mechanical-research engineer in the motive power department of the Interborough Rapid Transit Company, New York City, has been appointed secretary of the power division of the American Society of Mechanical Engineers for 1923.

William T. Crawford has succeeded George A. Peirce as secretary of the Rio Grande Valley Traction Company, the Northern Texas Traction Company, the Houston Electric Company and the Tarrant County Traction Company, all Stone & Webster properties. Mr. Crawford is located in Boston, at the main office.

Charles Fields has been appointed superintendent of the Morris County Traction Company, Morristown, N. J. Mr. Fields was with the New York & Queens County Railway, Long Island City, as chief inspector for seven years. In that same capacity he served with the Binghamton (N. Y.) Railway for five years. He was also associated with the J. G. White Management Corporation for eighteen months.

H. J. Sheeran some time ago was appointed assistant to the general manager for the receiver and secretary for the receiver of the New York Railways. In that position he succeeded F. T. Wood, who resigned to accept the position of president and general manager of the Fifth Avenue Coach Company. Mr. Sheeran has been connected with the New York Railways and its predecessors for more than twenty years. During that period he was associated with Mr. Wood in executive and operating capacities.

Frederick W. Gnichtel has been appointed by Governor Silzer as a member of the Board of Public Utility Commissioners of New Jersey. He will succeed Harry Bacharach, Republican, Atlantic City, whose term has expired. The appointment is for six years, at $12,000 annually. Judge Gnichtel was admitted to the New Jersey bar in 1893. Chancellor Walker appointed him an advisory master of the Court of Chancery a year ago. Mr. Gnichtel was formerly Mayor of Trenton. He is a Republican.

Clement Studebaker, Jr., has been elected a director of the Mississippi Valley Trust Company, St. Louis, Mo. Mr. Studebaker is the son of the late Clement Studebaker, Sr., financier and automobile manufacturer. He is identified with large public utility properties in Indiana, Illinois and Missouri, and is president of the Citizens' National Bank of South Bend, Ind. He is the chairman of the board of directors of the North American Light & Power Company, which it is proposed to consolidate with the Illinois Traction System into a new company to be known as the Illinois Power & Light Corporation, of which he will be president.

D. W. Snyder Heads Illinois Electric Association

D. W. Snyder, general manager of the Bloomington & Normal Railway & Light Company, Bloomington, Ill., since 1917, was recently elected president of the Illinois State Electric Association. After his graduation from Lafayette College in 1907 with an E.E. degree Mr. Snyder entered the East Pittsburgh works of the Westinghouse Electric & Manufacturing Company. The year 1909 was spent in construction work, and one year later he joined the Northampton Traction Company, Easton, Pa., as superintendent. From 1911 to 1914 he served as manager of the Clinton Gas & Electric Company, Clinton, Ill., and in 1915 he became connected as general superintendent with the Jefferson City Light & Power Company. Subsequently he was appointed to the position he now holds in Bloomington, Ill.



D. W. Snyder

Sir Henry Thornton has succeeded D. B. Hanna as president of the Niagara, St. Catherines & Toronto Railway, St. Catherines, Ont., and of the Toronto (Ont.) Suburban Railway. Major Graham Bell has succeeded A. J. Mitchell as vice-president of both properties mentioned. W. J. Oliver, who was formerly purchasing agent of the Niagara, St. Catherines & Toronto Railway, has been replaced by H. T. Brown, and Fred Jones has succeeded J. W. Walker as master mechanic of the Toronto Suburban Railway.

M. T. Montgomery, formerly general storekeeper and later "Suggestion Man" of the Pittsburgh (Pa.) Railways, has succeeded R. A. Cale as superintendent, claim and purchasing agent of the Atlantic & Suburban Railway, Pleasantville, N. J. Mr. Montgomery's railway experience began in 1898 with the Union Traction Company, which is now a part of the Pittsburgh Railways. In July, 1919, after having been manager of railways of the Monterey Railway, Light & Power Company, Monterey, Mexico, for six years, Mr. Montgomery became special assistant to the general manager of the Pittsburgh Railways.

C. D. Emmons, president of the American Electric Railway Association, is announced as one of the speakers at the session on motor buses to be held at the automotive transportation meeting of the Society of Automotive Engineers at Cleveland, Ohio, on April 26 and 27. Mr. Emmons is down on the program to speak at the session on the morning of April 27.

W. S. Wells, freight claim agent of the South Brooklyn Railway, New York, N. Y., has been appointed general freight agent. Besides his new duties Mr. Wells will continue in the capacity of freight claim agent. He started with the company in 1905 as a clerk in the freight office at Twenty-third Street. Since then he has served as agent at the Bush Docks, clerk in the main office of the freight department and as chief clerk in the office at Twenty-third Street. In 1906 he was made freight agent at Twenty-third Street and on March 1, 1920, was appointed freight claim agent. Prior to connection with the South Brooklyn property he was identified with the Philadelphia & Reading Railway.

David Elwell has been appointed manager of the New York office of Lockwood, Greene & Company, succeeding W. H. Rose. Mr. Elwell was graduated from the Massachusetts Institute of Technology in 1904. During his college years he did work for the Massachusetts Harbor and Land Commission and, after graduation, was with the Edison Electric Illuminating Company of Boston, the Westinghouse Electric & Manufacturing Company at East Pittsburgh and was superintendent on electrifications of the New York division of the New York, New Haven & Hartford Railroad, representing the electrical construction department of the Westinghouse company. The four following years he was in the sales department of the Westinghouse company in New York City and for five years was electrical engineer in the Boston office of Lockwood, Greene & Company. He was transferred to the New York office in 1920 and has been with the company in that city ever since.

Obituary

Roderick John Mackenzie, Canadian railroad man, died in Los Angeles on March 1. He was for a number of years a director of the Winnipeg (Man.) Electric Railway, from which position he resigned in 1918. Mr. Mackenzie's activities in western Canada were confined largely to steam railroad interests. His father, Sir William Mackenzie, until 1918 was the president of the Winnipeg Electric Railway and also president of the Canadian Northern Railway System.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

New Car Building Plant

Missouri Car Company, with Works in East St. Louis, Ready to Engage in Construction

The Missouri Car Company, designer and builder of steel cars and auto bus bodies, plans to open its plant at Twenty-fourth Street and McCasland Avenue, East St. Louis, Ill., on April 15.

This company maintains general offices in the Chemical Building, St. Louis, Mo. It was organized about a year ago by Theodore A. Brewster, Edward S. Stebbins and others. The company is capitalized for $500,000 and has more than $300,000 invested in its large plant and the ten-acre tract on which it stands.

The building, although not constructed for the company, required few alterations to comply with the firm's plant requirements. It is situated on the Terminal Railroad Association's belt and through it has physical connections with twenty-six trunk line railroads that enter the East St. Louis gateway. On the other side of the plant is the Southern Railroad. The facilities for securing raw material are almost ideal, with the plant in the center of the East St. Louis industrial district. Electric power is obtainable from the East St. Louis Light & Power Company.

The company is equipped to manufacture electric cars of all patterns and automobile chassis. The plant has an estimated capacity of 600 to 800 street cars annually. It is expected that it will be capable of attaining quantity production within three months after starting operations. Among the other products of the plant will be a non-rollicking truck for which Mr. Brewster holds the patent. It is also planned to make a stock motor bus body, but the facilities of the company will permit the manufacture of a bus body according to any desired pattern.

Because of the uncertainty as to the date on which the plant would be in operation the company prior to April 5 had not contracted for any orders, but it has received inquiries from four large transportations systems. One Eastern company indicated its desire to order 250 cars, deliveries to be made within three months. The other inquiries were for smaller amounts.

The plant building is of semi-fireproof construction, one story high and 105 ft. by 567 ft. It has been equipped with a modern sprinkler system at a cost of $55,000. The walls and partition walls are of brick laid in cement and provided with a saw-tooth roof. The shop is divided into three principal sections, the steel shop, the wood mill and the fabricating department.

Mr. Stebbins, the president of the company, has had considerable experience in the selling and financial fields. He will direct the sales organization and handle the financial details for the company. He was formerly Western district manager for a large Cleveland industrial plant.

Mr. Brewster, the vice-president and chief engineer, was for fourteen years with the J. G. Brill Company of Philadelphia, seven years with the St. Louis Car Company and four years with the Kuhlman Car Company of Cleveland and other concerns. He has acted as plant manager, production director and chief engineer, and will be in charge of production for the Missouri Car Company. He has designed the plant so as to take full advantage of his past experience, a feature of his planning being an arrangement whereby physical handling of materials is practically eliminated, conveyors carrying wood, steel, etc., from one department to another as required.

The other officers are:

Alfred H. Palmer, second vice-president, with the George L. Dyer Insurance Agency Company; Wilbur L. McKim, treasurer, also vice-president of the Koken Companies, St. Louis, the Chisholm-Koken Barber Supply Company, New York, and Illmo Supply Company, St. Louis; Lawrence J. McKim, secretary, a graduate of Missouri University and the Washington University Law School. These officers and Dr. W. P. Henrich and A. G. Muesenfechter constitute the board of directors.

3,000-Volt D. C. Locomotives Shipped to Spain

Three of the six 100-ton, 3,000-volt electric locomotives comprising part of the $1,500,000 contract for the electrification of 40 miles of the Spanish Northern Railway were shipped by the International General Electric Company on the *S.S. Florinda* on April 9 from South Brooklyn in the presence of a party of engineers and officials, including the Spanish Consul General and his staff.

These locomotives are of particular interest since they are a somewhat novel design using three-axle instead of the usual two-axle trucks. Each locomotive is equipped with two trucks and six 400-hp. motors, giving a capacity sufficient to handle a full tonnage train up the 2 per cent grades at 22 m.p.h. On the return trip the trains will be held by regenerative electric brakes, thus saving wear on brakeshoes and wheels.

In addition to the locomotives, the contracts placed by the Spanish Company include equipment of two 300-kw. substations and material for overhead distribution for the entire electric zone. Shipment of this latter equipment has already been made and is being installed by the Spanish Company. It is understood that six additional locomotives are also on order, which will be for the most part built by Spanish manufacturers.

The photograph shows the cab of one locomotive in position on deck and the Spanish Consul and his staff standing in front of the machine.



Spanish Consul and Staff See Shipment of Locomotives Put on Shipboard

Price of Steel Is Not Expected to Advance at Once—Production Greatest in History

A significant development of the week in trade was the announcement of an advance of 11 per cent in steel plant wages effective April 16. According to *Iron Age*, on the basis of 40 cents an hour for common labor instead of 36 cents, steel making costs are increased to the producer about $1.75 a ton. Prices to the consumer have advanced much more than this since Sept. 1 when steel works wages went up, but the great bulk of mills shipments, especially in the case of the Steel Corporation. are still at the lower prices of last fall. At 146,500 tons a day as the estimated March output for the country, steel production was at a yearly rate of 45,500,000 tons whereas the greatest year's record was 43,619,200 in 1917. Important buyers are said to be covered well ahead now. The opinion is that the 11 per cent increase in wages will not result in further advances in prices to the consumer at this time. It is said that the advance in wages had long been expected and had virtually been written into present-day prices. This is the feeling both in Pittsburgh and in Chicago.

Chilean Locomotive Order Being Filled Rapidly

The Westinghouse Electric & Manufacturing Company has recently delivered six express passenger locomotives for the electrification of the Chilean State Railways. To date, twenty. of the thirty-nine locomotives included in the contract for locomotives of several types have been shipped. The substation and line material went forward during the latter part of 1922.

The State Railways officials hope to have in operation at the time of the Pan-American Exposition one section of the railway system which is now being electrified.

Metal, Coal and Material Prices

Metals—New York	April 10, 1923
Copper, electrolytic, cents per lb	17.625
Copper wire base, cents per lb	19.625
Lead, cents per lb	8.25
Zinc, cents per lb	7.75
Tin, Straits, cents per lb	46.625
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	6.25
Somerset mine run, Boston, net tons	3.375
Pittsburgh mine run, Pittsburgh, net tons	2.00
Franklin, Ill., screenings, Chicago, net tons	2.075
Central, Ill., screenings, Chicago, net tons	1.625
Kansas screenings, Kansas City, net tons	2.625
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft	7.50
Weatherproof wire base, N. Y., cents per lb.	19.50
Cement, Chicago net prices, without bags	$2.20
Linseed oil (5-bbl. lots), N. Y., per gal	$1.17
White lead, (100-lb. keg), N.Y., cents per lb	13.375
Turpentine, (bbl. lots), N.Y., per gal	$1.61

Rolling Stock

Detroit (Mich.) Municipal Railway is building twenty-five cars in its own shops largely from material taken over from the Detroit United Railway. The cars will be ready for service about June 1. If traffic continues to grow, more cars will be needed but no immediate purchase is contemplated.

Hydro-Electric Power Commission, Toronto, Ont., will shortly place an order for twelve cars. It is expected that this number will be made up of eight one-man two-men cars, two large interurban cars and two express cars. This number is in addition to the order placed recently for four cars of the one-man two-man type.

Schenectady (N. Y.) Railway will buy new equipment to carry out a recent order of the commission. The ruling includes the purchase of six new interurban cars for use on the Albany-Schenectady line, and the Troy-Schenectady line, and the purchase of an additional twelve cars for use in the city of Schenectady. The company is also instructed to secure one new double-truck snow plow before Nov. 1.

Danville Traction & Power Company, Danville, Va., has placed an order for five cars with the Perley A. Thomas Car Works. They are described as follows:

Date order was placed	Jan. 17, 1923
Date of delivery	June 15, 1923
Type of car	Double-truck, semi-convertible motor
Seating capacity	Forty
Total weight	32,600 lb.
Bolster centers, length	15 ft. 10¾ in.
Length over all	39 ft. 8 in.
Truck wheelbase	5 ft. 4 in.
Width overall	8 ft. 4⅞ in.
Height, rail to trolley base	10 ft. 11⅛ in.
Body	Steel
Interior trim	Cherry
Headlining	Agasote
Roof	Arch
Air brakes	Westinghouse Traction Brake Company
Car signal system	Consolidated Car Heating Company
Car trimmings	Bronze
Control	General Electric Company
Couplers	Pocket type
Curtain fixtures	Curtain Supply Company
Curtain material	Pantasote Company
Designation signs	Keystone
	Electric Service Supplies Company
Door operating mechanism	Manual
Fare boxes	Johnson Fare Box Company
Fenders or wheelguards	Consolidated Car Fender Company
Gears and Pinions	General Electric Company
Hand brakes	National Brake Company
Heater equipment	Consolidated Car Heating Company
Headlights	Golden Glow
Lightning arresters	General Electric Company
Motors, type and number	Four GE No. 265
Motors	Inside hung
Registers	International
Sanders	Air
Sash fixtures	O. M. Edmonds
Seats	Heywood Brothers & Wakefield
Seating material	Wood slat
Slack adjuster	American
Step treads	Mason Safety
Trolley catchers or retrievers	Earll
Trolley base	U. S. No. 13-E
Trucks	Taylor reduced height, 26-in. wheels
Wheels	Cast Iron, 26 in.

Track and Roadway

Wisconsin Rapids (Wis.) Street Railroad will spend $8,000 during the year for additional equipment, improvements and new construction work to its system.

Market Street Railway, San Francisco, Calif., is reconstructing all four tracks on Market Street from Sansome to the Embarcadero.

Twin City Rapid Transit Company, St. Paul, Minn., will begin work at once on the laying of tracks to the site of the Ford Motor Company at High Dam. At this point a new Ford plant is soon to be started.

Lake Shore Electric Railway, Cleveland, Ohio, through general manager Coen, has signed an agreement with Fremont city officials whereby the company agrees to pay its share of East State Street improvement.

Portland (Ore.) Railway, Light & Power Company plans repairs to street car tracks in various parts of the city at a cost of $500,000 during 1923, according to F. I. Fuller, vice-president of the company.

Trade Notes

Bridgeport (Conn.) Brass Company has moved its Chicago district sales office from the State Lake Building to the Wrigley Building.

Samuel P. McGough has been appointed Western sales agent of the Lorain Steel Company with headquarters at 1320 Monadnock Building, Chicago. In this capacity he succeeds Andrew Sylvester Littlefield, whose death was referred to in the ELECTRIC RAILWAY JOURNAL, issue of March 24.

The Pennsylvania Crusher Company announces the opening of a Chicago office under the management of Clinton S. Darling. Until May 1 the office will be in the Monadnock Building, after which it will be permanently in the Illinois Merchants' Bank Building, 230 South Clark Street.

Ralph W. Read, formerly with the McGraw-Hill Company as copy writer on various papers at Chicago, and later as advertising manager of *Electrical Merchandising* at Cleveland, has joined the J. A. Snyder Company, advertising agency, with offices in Chicago. More recently he was advertising manager of the F. H. Roberts Company, Boston. Mr. Read will be in charge of the technical department created and equipped to render the special service required by advertisers in the equipment field.

New Advertising Literature

Irving Iron Works Company, Long Island City, N. Y., in its Catalogue 3A describes with illustrations the complete story of the fireproof ventilating flooring and Irving safstep. The pamphlet contains some seventy-two pages.

Uehling Instrument Company, Paterson, N. J., is mailing to its friends copies of a folder describing several Uehling products which have for their purpose the increase in boiler-room and turbine-room efficiency. The folder contains useful technical data in this field.

Pennsylvania Crusher Company, Philadelphia, Pa., has issued a new bulletin, No. 1005, describing the company's coal-preparation machinery, such as is used in power plants and elsewhere. The bulletin also covers primary and secondary crushers for cement, rock and limestone.

PEACOCK BRAKES



Pay for Increased Safety with

Economies in Maintenance

Due to their correct construction of properly selected materials, Peacock Brakes involve practically no expense for repairs and replacements. One large company bought 650 sets and never required another replacement in five years of constant service.

Compare this result with what you have to spend each year for maintaining inefficient worn-out hand brakes on your old cars.

Compare and capitalize this cost of repairs and you will find that an entirely new equipment of Peacock Brakes will save you enough in three years' maintenance to pay for themselves. Isn't it worth while to consider securing new hand brakes, when they pay for themselves so quickly? You needn't charge a cent to investment—a new equipment of Peacock Brakes can be a maintenance charge, spread over about three years.

The argument is clinched by the superior safety features of Peacock Brakes. They have maximum power, greatest speed of action and almost unlimited capacity. They will make those old cars safer to operate under modern conditions.

Let us submit figures

National Brake Company, Inc.

890 Ellicott Square, Buffalo, N. Y.

Canadian Representative:
Lyman Tube & Supply Company, Limited
Montreal, Canada



"The Peacock Staffless"



Peacock Improved 12/52 Gear Ratio Brake

Bankers and Engineers

Ford, Bacon & Davis
Incorporated
Business Established 1894
115 BROADWAY, New York
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This is a DOSSERT SOLDERLESS Calbe Tap

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There is economy in making every electrical connection by the Dossert Solderless method—giving greater conductivity than the wire itself—and without the fuss, danger and damage to insulation that high heat imposes.

The Dossert 15th Year Book below illustrates and describes the services of the different connectors.

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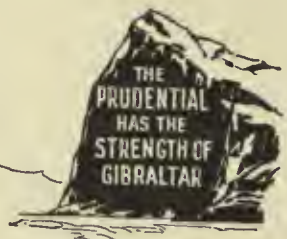
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120 Broadway New York

THE P. EDWARD WISH SERVICE

50 Church St. NEW YORK — *Street Railway Inspection* DETECTIVES — 131 State St. BOSTON

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GROUP LIFE INSURANCE



For the employer with an interest in his employees.

Write today for the plan that will meet your needs.

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PRUDENTIAL
INSURANCE COMPANY OF AMERICA

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HOME OFFICE: NEWARK
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DAYTON

They did not believe they could Save $6,000 per mile

—but experience proved that our claim is based on fact

The first cost of track laid on Dayton Resilient Ties is $6,000 per mile cheaper than that laid on wood ties on concrete foundation and $2,000 per mile cheaper than that laid on wood ties on gravel ballast.



RESILIENT TIES will enable you to build *more track* and *better* track for the same money—or the same amount of track for far *less* money.

Consider the saving of $6,000 per mile in concrete roadbed. Considerable. Yet there are reliable figures from Resilient Tie jobs in many parts of the country which supply evidence that this saving has actually been accomplished time and again.

But the mere fact that Resilient Tie jobs *cost less* is not enough. You may also have absolute assurance that Resilient Ties actually provide *better* track than wood ties. Accurate statistics show that not only is maintenance cost greatly reduced, but that the *resiliency* of these modern ties effects a considerable saving in repairs on rolling stock —with less jarring there is less wear, and less wear means longer-lived cars and reduced costs.

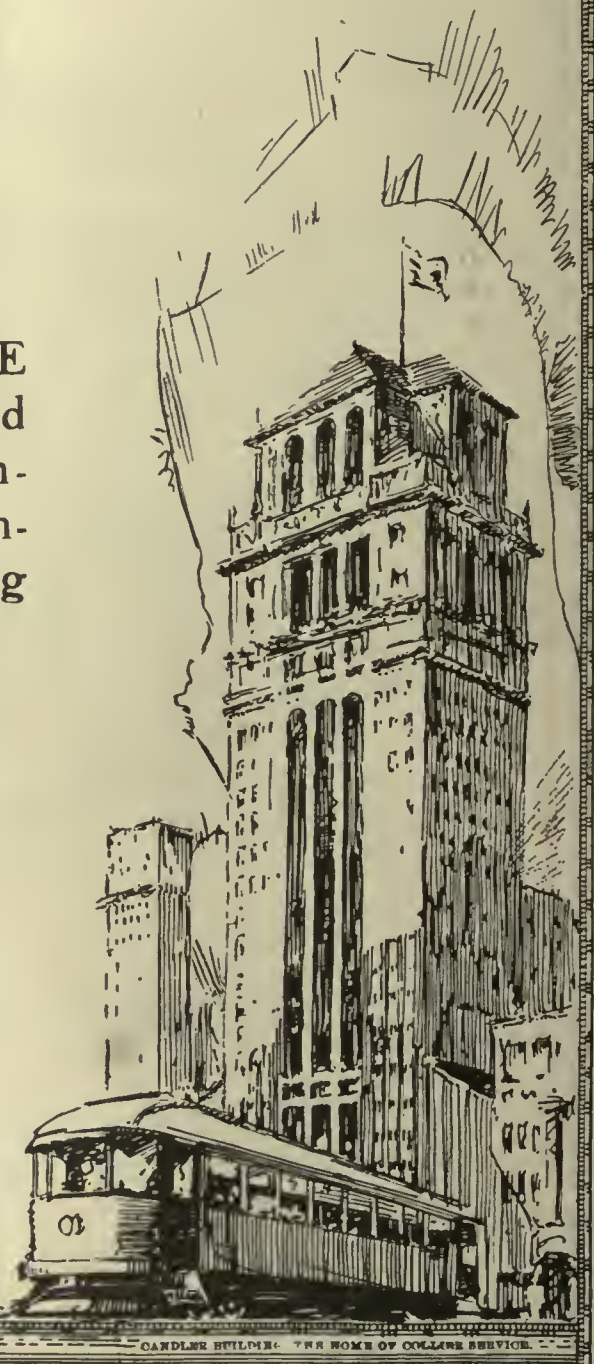
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for actual cost figures
on Resilient Tie Track Construction

THE DAYTON MECHANICAL TIE CO.
706 Commercial Building, Dayton, Ohio
Canadian Representative:
Lyman Tube and Supply Co., Ltd., Montreal, Quebec

Resilient TIE

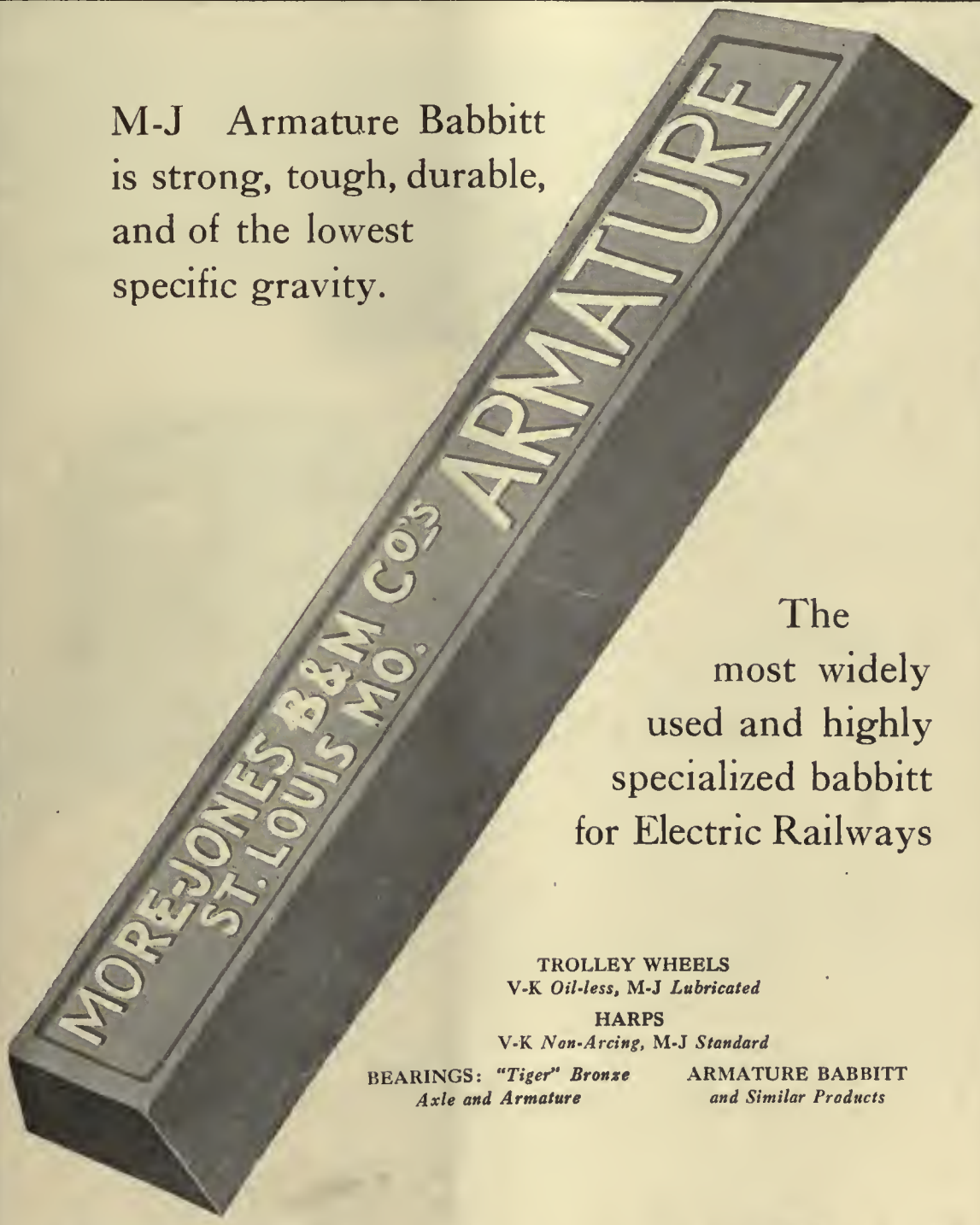
— saves first cost !
— saves maintenance !
— saves rolling stock !

COLLIER SERVICE sustains car card space value by maintaining a nation-wide organization of car advertising experts.



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INCORPORATED
CANDLER BLDG NEW YORK

M-J Armature Babbitt is strong, tough, durable, and of the lowest specific gravity.



The most widely used and highly specialized babbitt for Electric Railways

TROLLEY WHEELS
V-K *Oil-less*, M-J *Lubricated*

HARPS
V-K *Non-Arcing*, M-J *Standard*

BEARINGS: *"Tiger" Bronze Axle and Armature*

ARMATURE BABBITT *and Similar Products*

MORE-JONES BRASS & METAL CO.
St. Louis Missouri
QUALITY PRODUCTS



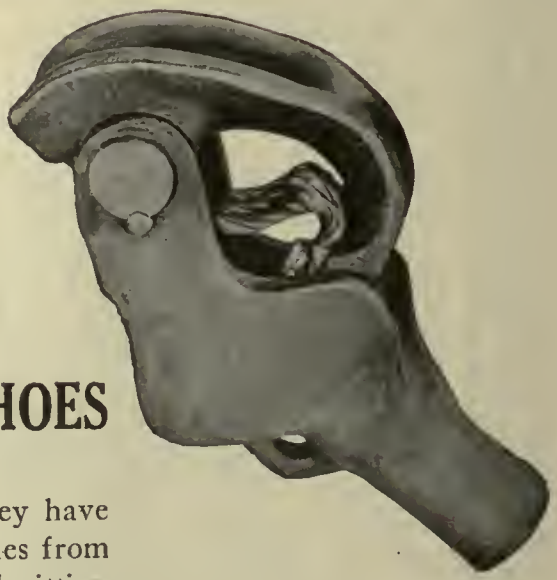
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In 1895—

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was the Nantasket Branch of the New York, New Haven & Hartford R. R. It was practically the first of its kind in the United States. Since then they have tried third rail contact and all kinds of trolley wheels.



In 1921—

they equipped their cars with

MILLER TROLLEY SHOES

(patented)

Better service has resulted. They have almost entirely eliminated troubles from trolley dewirements. Arcing and pitting of trolley wire is reduced to almost nothing compared with what trolley wheels did. With wheels there was continual maintenance expense for worn-out bushings as well as the wheels themselves. With Miller Trolley Shoes there is nothing but the metal contact groove to wear out and this is easily replaced when necessary. The wear is slight owing to reduced trolley tension and freedom from sparking.

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Safety—Economy—Endurance

These three are requisites of true efficiency and can be secured by the use of

Carnegie Steel Cross Ties

As the use of Steel Cross Ties is an essential item toward the attainment of The Perfect Track, so then should they be included as an essential item in your track maintenance program.

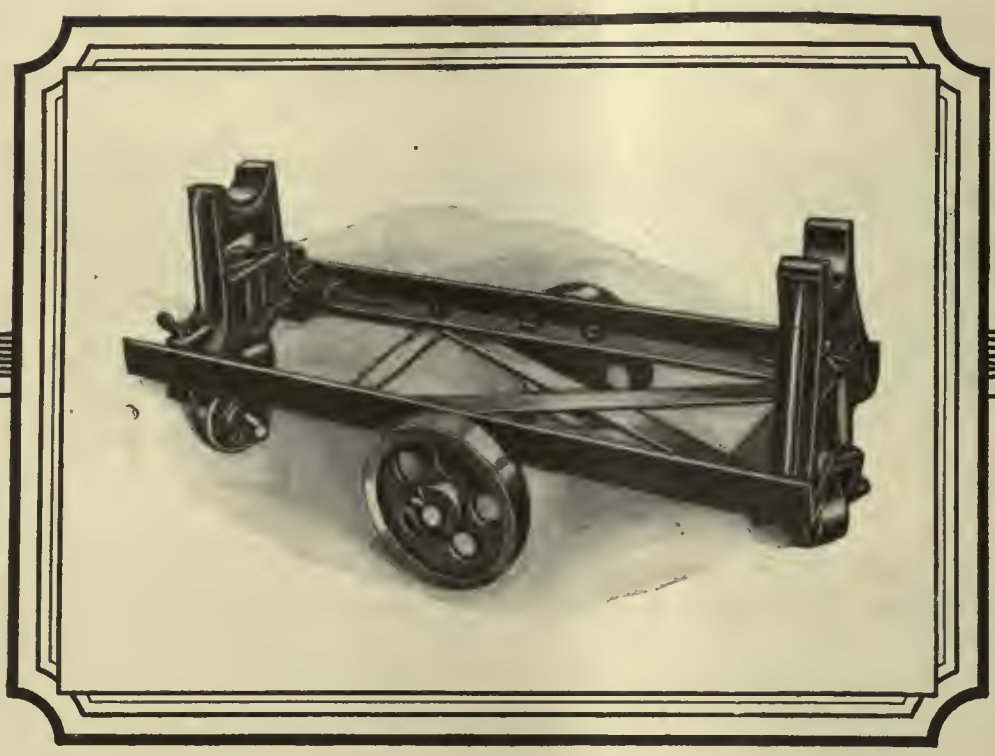
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1608



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For Heavy High-Speed Electric Railway Service Baldwin Motor Trucks are Efficient and Economical

This type of Baldwin Improved Motor Truck is specially recommended on long interurban lines, where "limited" or sleeping cars are operated. It is also suitable for use under double-truck electric locomotives.

These trucks permit of easy inspection and repairs, and show low maintenance costs in operation.

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A fifteen-ton, 54-seat, safety car, equipped for one-man or two-man operation. Separate entrance and exit doors at each end, both ends controlled at the brake handle. All the standard interlocking safety devices are provided.

Here is a car for operating economy and maintenance economy. Its standardized construction means lower costs.

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General Dimensions

Length over all	42 ft. 5½ in.
Length over vestibule sheathing	41 ft. 2½ in.
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From rail to top of floor	2 ft. 7¼ in.
From rail to top of roof	10 ft. ¾ in.
Truck centers	21 ft.

Trucks

St. Louis Car Co. Am. 64 Type with chrome nickel steel heat-treated arch bars. Wheelbase 5 ft. 4 in.; wheels 26 in. diam.; journals 3¼ in. x 6 in.

St. Louis Car Company

St. Louis, Mo.

"The Birthplace of the Safety Car"

Lightest—Strongest—Simplest—Neatest

That's HALE & KILBURN Seats

Made in a wide variety of styles and finish. A suitable type for every kind of car and every kind of service.



Lightest Weight Stationary Steel Seat

Attractive
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Lightest Weight Walkover Steel Seat

Cost no more than others
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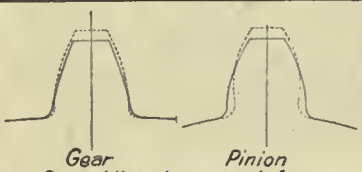
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PHILADELPHIA

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Helical Gearing



Gear Pinion
Dotted line shows tooth-form 4½° involute. Solid line shows tooth-form of Nuttall Helicals.



Rounded Teeth

For Serious Consideration By Your Engineers

Nuttal Helical Gears and Pinions mesh much like a big nut engages the threads of a screw. There is *no* shock, no vibration, and almost no wear. This lengthens equipment life.

The tooth form of Nuttall Helical Gears is scientifically correct. There is no undercut at the tooth root where the greatest strength is required. This is another item materially increasing the life of equipment.

Nuttall Helical Gear and Pinion teeth are rounded at the ends. This facilitates installation and eliminates some troubles which occur with flat ends, due to the sharp, hard edges chipping, or their tendency to cut. This seemingly small feature has saved much time and money.

We mention a few seemingly minor features to show you how deeply and thoroughly we go into every detail which will make gears and pinions better.



Special Drop Forged Pinion Blank

Nuttall Pinion Blanks are specially drop forge by a process which practically equalizes the longitudinal and transverse ductility. Ordinary forged pinions are out of proportion in these characteristics in ratios as great as 2 to 1.

All Nuttall Heat-Treated Pinions are ground in the bores. The importance of this feature, giving accuracy measured in thousandths, cannot be overestimated, as it not only facilitates and insures fits on taper shafts, but insures perfect meshing, on true centers and axial positions.



Pinion with Ground Bore

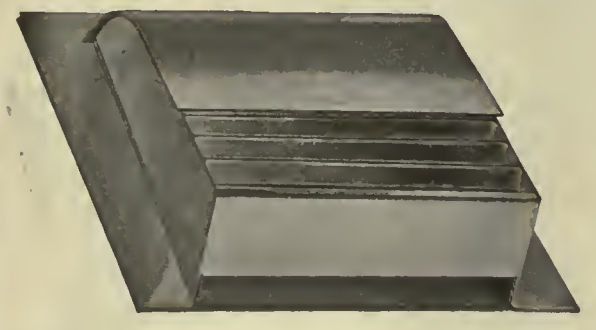


Pinion without Ground Bore.

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PITTSBURGH PENNSYLVANIA

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National Railway Appliance Co.

Grand Central Terminal, 452 Lexington Ave., Cor. 45th St., New York

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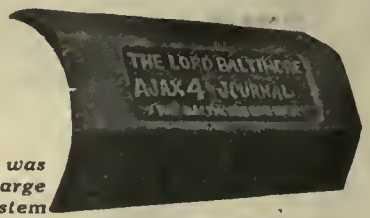
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National Hand Holds
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Economy Electric Devices Co., Power Saving Meters
Lind Aluminum Field Coils
C-H Electric Heaters
Garland Ventilators
National Safety Car Equipment Co.'s One-Man Safety Cars
Flaxlinum Insulation
E-Z Car Control Corporation Safety Devices

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"Reproduction of Ajax Car Brass that ran 336,000 miles before wearing too thin for further use."

This Car Brass was sent to us by a large Electric Railway System



We do not guarantee all our Car Brasses to wear as long—but this Time Record points to why, after thirty years' experience, Ajax Metals stand at the top.

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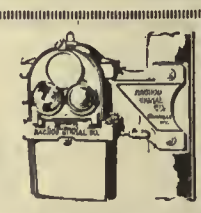
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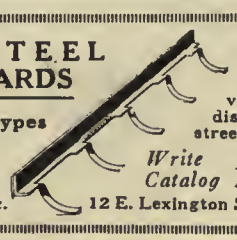
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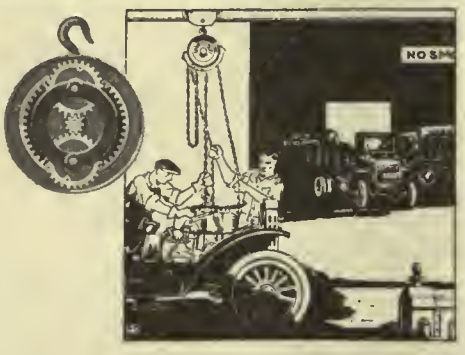
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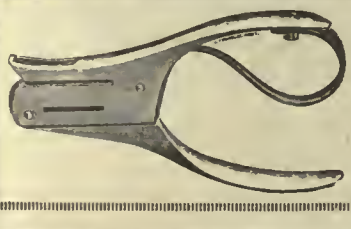


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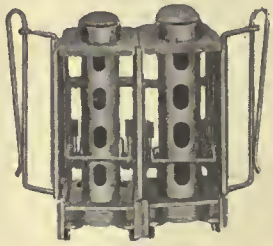
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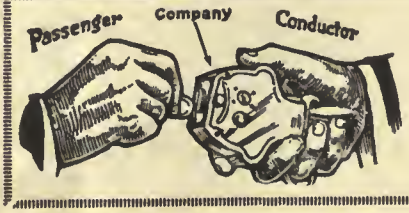
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STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACT OF CONGRESS OF AUGUST 24, 1912

Of Electric Railway Journal, published weekly at New York, N. Y., for April 1, 1923.

State of New York } ss.
County of New York }

Before me, a Notary Public in and for the State and county aforesaid, personally appeared James H. McGraw, Jr., who, having been duly sworn according to law, deposes and says that he is the Secretary of the McGraw-Hill Company, Inc., Publishers of Electric Railway Journal, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are: Publisher: McGraw-Hill Company, Inc., 10th Ave. at 36th St., New York, N. Y. Editors, H. W. Blake and H. L. Brown, 10th Ave. at 36th St., New York, N. Y. Managing Editor, None. Business Manager, L. W. Seeligsberg, 10th Ave. at 36th St., New York, N. Y.

2. That the owners are: (Give names and addresses of individual owners, or, if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent or more of the total amount of stock.) McGraw-Hill Company, Inc., 10th Ave. at 36th St., New York, N. Y. James H. McGraw, 10th Ave. at 36th St., New York, N. Y. Arthur J. Baldwin, 10th Ave. at 36th St., New York, N. Y. Henry W. Blake, 10th Ave. at 36th St., New York, N. Y. Fred R. Low, 10th Ave. at 36th St., New York, N. Y. Leonard D. Baldwin, 27 Pine Street, New York, N. Y. James H. McGraw and James H. McGraw, Jr., Trustees for: Harold W. McGraw, James H. McGraw, Jr., Curtis W. McGraw, Donald C. McGraw, 10th Ave. at 36th St., New York, N. Y. Essex Co. Trust Co., et al., Trustees for Estate of John A. Hill, East Orange, New Jersey. Leonard D. Baldwin and Arthur J. Baldwin, Trustees for: Donald Baldwin, Grace Riker, Franklin Baldwin, Cynthia Hazelton, 27 Pine Street, New York, N. Y. Malcolm Muir, Trustee for Lida K. Muir, 10th Ave. at 36th St., New York, N. Y. Grace W. Mehren, 53 Fairview Ave., South Orange, N. J. Curtis W. McGraw, 370 Seventh Ave., New York, N. Y. Donald C. McGraw, 10th Ave. at 36th St., New York, N. Y.

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5. That the average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the six months preceding the date shown above is (This information is required from daily publications only.)

JAMES H. McGRAW, JR.

Sworn to and subscribed before me this 24th day of March, 1923.

[Seal.] MARTIN J. WIEMER.

Notary Public Kings County, Certificate No. 27. Certificate filed in New York County No. 44.

(My commission expires March 30, 1924.)

TRUSTEES SALE

By decree of the Common Pleas Court of Montgomery County, sitting in equity, the Norristown Trust Company, Trustee, will sell at the Court House, Norristown, Pa., in Court room No. 1 at one o'clock P. M. on Monday, April 30, 1923, all the charter and franchise rights, together with all its property, leaseholds, railway and transmission lines, rolling stock, and all property, real, personal and mixed, of the Montgomery Transit Company, whose built line extends from Trooper to Harleysville, all in Montgomery County, and about 12¾ miles in length, with contract connections into Norristown and other points. See full advertisement in Norristown Herald. Further information furnished by Trustee. Certified check of $5,000 required to be filed with Trustee one hour before sale by bidders, 10 per cent at close of sale, balance sixty (60) days after confirmation. Knock down price $150,000. Further conditions at sale.

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FS-539, Electric Railway Journal, Real Estate Trust Bldg., Philadelphia, Pa.



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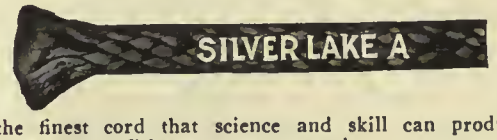
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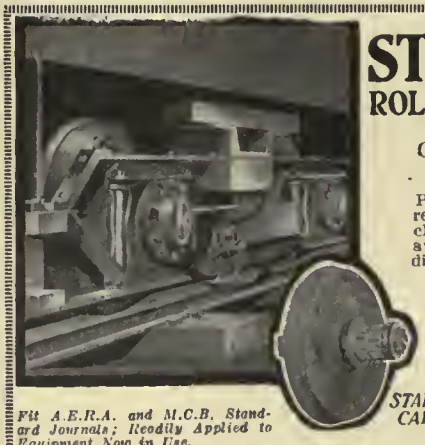
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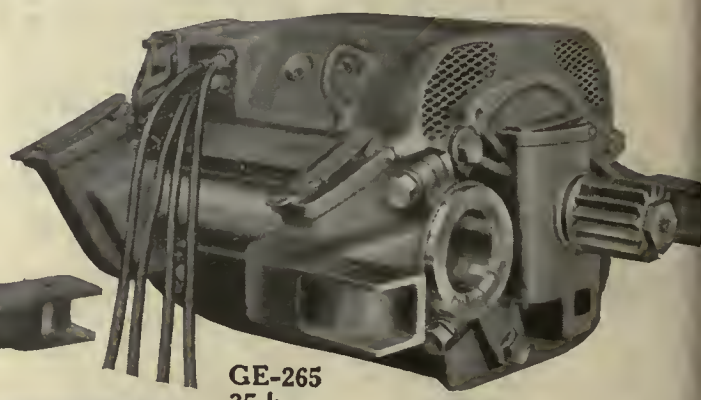
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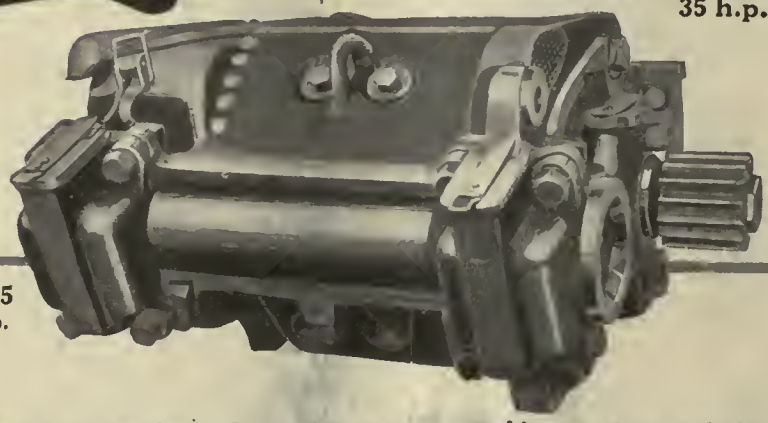
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25 h.p.

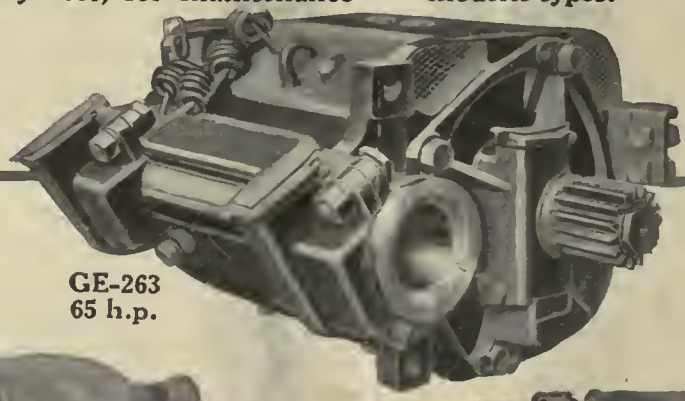


GE-265
35 h.p.



GE-275
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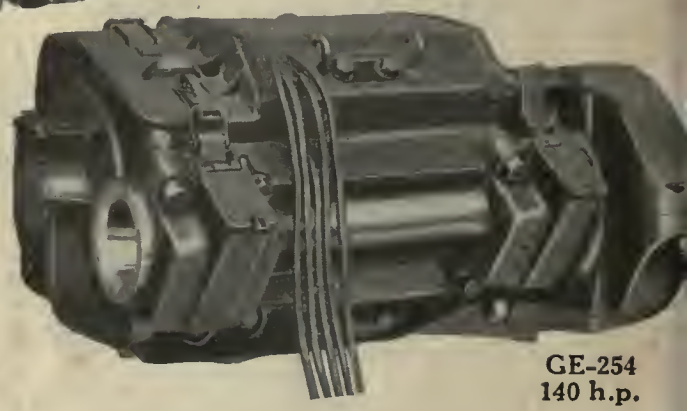
These six standard G-E Motors will meet the motive power requirements of any city, suburban or interurban service. On an average they cost, for maintenance and inspection, only $35 per motor per year. Consider the economy accruing from replacement of your old motors by one of these modern types.



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GE-240
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GE-254
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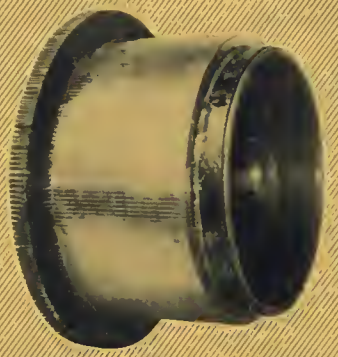
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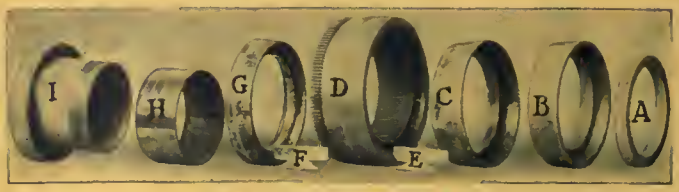
Complete Commutator.



Checking the Temperature of the Commutator with a Pyrometer before pressing.



Final tightening of Commutator while hot and under pressure.



Details of Commutator Parts

A. Metal Bushing; B. Insulating Bushing or Sleeve; C. Rear Mica "V" Ring; D. Assembled Mica and Copper Segments; E. Mica Strip or Segment; F. Copper Segment or Bar; G. Front Mica "V" Ring; H. Metal "V" Ring; I. Ring Nut.

The material used for each part entering into the construction of a Westinghouse commutator is carefully selected and of the highest grade.

During the assembling process each part is rigidly inspected and tested. The copper segments are accurately gauged, chemically cleaned and all burrs removed. The mica segments are made from mica that is free from impurities. The mica segments are built up under heavy pressure and machined to a uniform gauged thickness.

The "V's" of both the copper and mica segments after assembling are carefully and accurately machined and gauged to secure a tight fit of the metal and mica "V' rings. The "V's" are shellaced for protection from moisture.

The assembled segments are then assembled and tested for short circuits.

The assembled commutator is heated to a temperature of 125 to 150 deg. C. and, while hot, the "V's" are subjected to a pressure of from 10 to 40 tons (depending upon the size of the commutator). The locking device is then tightened.

After accurate machining, final inspection and tests are made. These include a check of the accuracy of the over-all dimensions and the tightness of the segments, also of the alignment of the segments with the keyway. Finally, a 500-volt test between bars and a 5000-volt ground test are applied.

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East Pittsburgh, Pa.

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(*Published in San Francisco*)
Industrial Engineer
(*Published in Chicago*)
American Machinist—European Edition
(*Published in London*)

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Balance

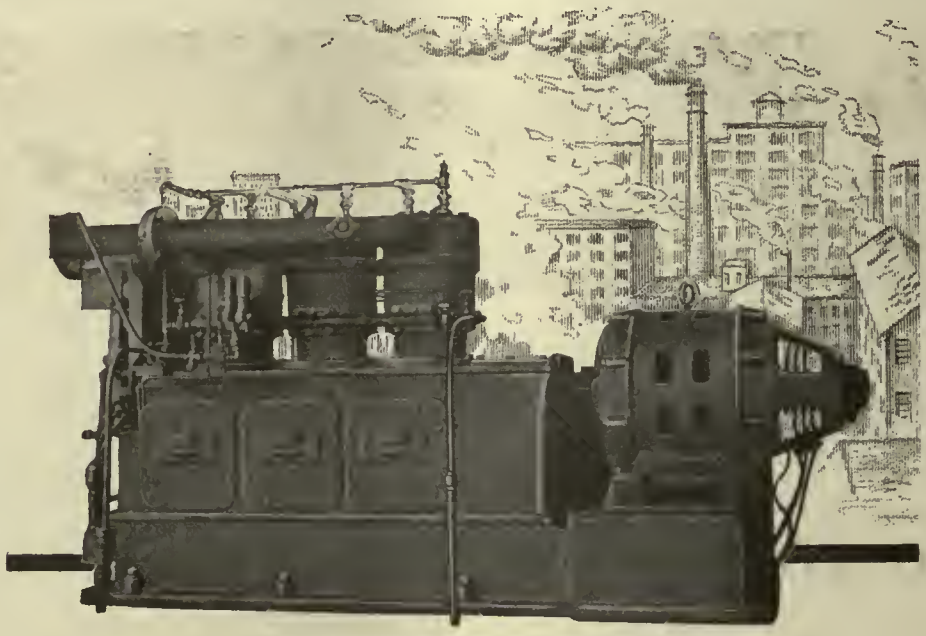
FEW papers have such a diversified range of subjects to cover in properly serving their field as has the JOURNAL. What interests the auditor may appeal but little to the engineer of way, and the transportation superintendent may find but small direct advantage in an article on shop practices.

As an illustration of how the editors aim to interest every class of reader, last week's number contained some 134 separate articles, of which about 100 were classified as news. The remainder covered the wide range of topics including finance, education, standardization, way matters, cars, equipment, transportation, buildings, power, public reports.

Next week the distribution may be quite different, but still an inspection will show that much in the issue will appeal to every reader. It must naturally follow, however, that more space will be devoted to the phases of work in which there is greatest activity, and that the space allotment among subjects must also be governed in part by the number of subscribers interested. Thus, balance of the text is sacrificed in the Monthly Maintenance Issue, because of the preponderant need for maintenance information.

The letters from subscribers show that all classes are receiving matter of benefit. It is noteworthy that electric railway men read much on topics not directly concerned with their duties. They thereby become better informed on the general practices of the business and gain ability to co-ordinate their own work with that of the whole company.

Circulation of this issue, 7,050 Advertising Index—Alphabetical, 64; Classified, 60, 62; Searchlight Section, 59



Quality Air Compressors That Save Power

Stationary and Portable Types

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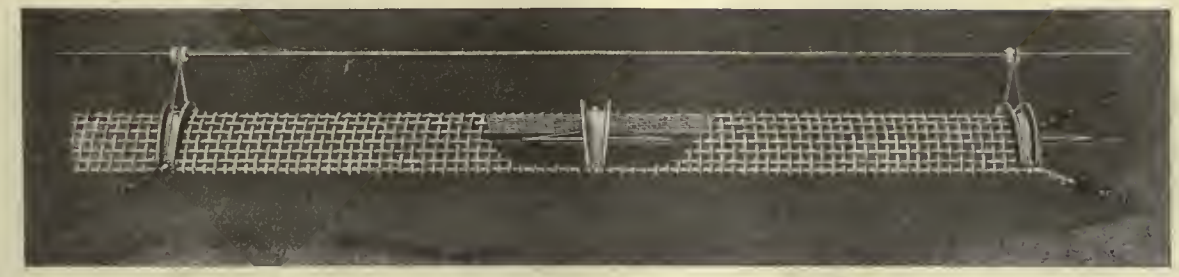
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Unique Application of National Trolley Guard in place of Trough under Elevated Track

Trolley guard is usually installed as a safety feature only — not as a matter of investment representing so much return.

It is just as essential to be insured for uninterrupted current at a crossing as it is to have good track and wheels for the car to run on.

National Trolley Guard will catch the trolley wheel, should it leave the trolley wire at or on a railroad crossing and carry the car past the danger zone.

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Why Should You Take Chances?

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Meet these Authorities

AFTER ALL, those who *know* the economy of steel tie construction are those who have laid it—and on their calm and experienced judgment, as it is displayed in their repeat orders, we rest our case with you. The figures in the table on the right are compiled from our records and our bookings from a few representative old customers who placed orders in January and February, 1923.

Our sales method is a sincere effort to co-operate in your investigation of Steel Tie Construction as to its performance and cost on other properties and its adaptability to your local conditions. It will be a pleasure to put this service at your disposal. Write today for complete information and delivered price.

THE INTERNATIONAL
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STEEL TWIN



on Steel Tie Construction

GENERAL LOCATION PROPERTY	First Installation	Total Mileage Steel Twin Tie Track Up to Dec. 1922	1923 Spring Order
An Indiana Interurban Company	1911	10.00 Miles	1.75 Miles
A Northern Ohio Company	1913	20.00 Miles	3.00 Miles
A Southern New England Company	1915	14.50 Miles	2.80 Miles
A Massachusetts City Company	1915	5.62 Miles	0.50 Mile
A Southern Colorado Company	1917	4.50 Miles	0.82 Mile
A Michigan Interurban	1917	3.00 Miles	0.75 Mile
An Eastern Pennsylvania Company	1918	2.00 Miles	3.00 Miles
A Tidewater Virginia Company	1921	0.11 Mile	0.30 Mile
A New York Urban Company	1922	2.38 Miles	2.10 Miles

STEEL TIE COMPANY

L A N D

TIE TRACK

Insurance plus Marsh & McLennan Service

Additions and Betterments

When plans are taking shape for additions and betterments, you can profitably employ the services of Marsh and McLennan engineers.

They enable you to safeguard profits, eliminate hazards and reduce insurance cost.

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Leaders

of a Long List of Favorites

And why? Because operators who take pride in the appearance of their cars and in the matter of conveniences they offer the people who buy their service have found out that Keystone Car Specialties go a long way toward gratifying this commendable effort. Keystone Specialties are favorites of the men on the platforms as well. You will find them on nearly every car operated by the companies that believe in "safety first" and "service next."



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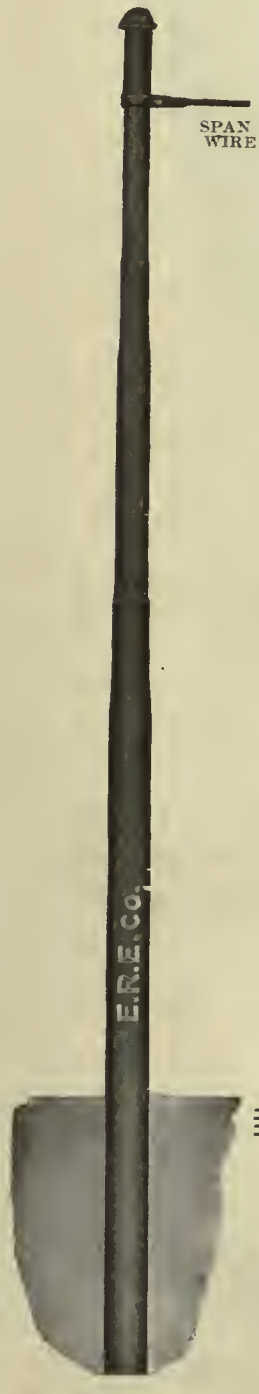
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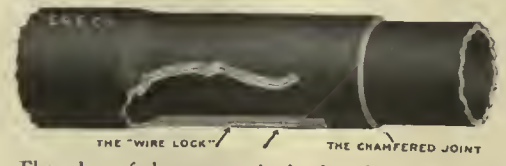
Plain Tubular Steel

Extra strong, and capable of sustaining heavy strains in any direction—especially valuable at corners. No angles or pockets to retain moisture—no corners accessible to corrosion—most accessible to painting.

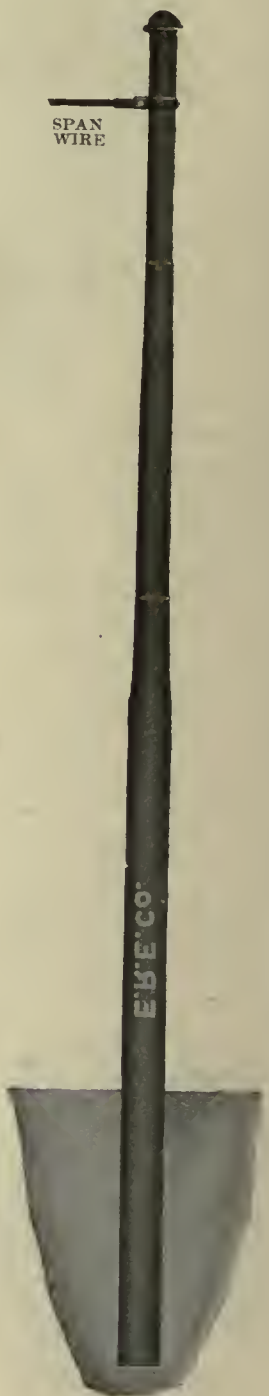
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Elreco Poles in combination with highly ornamented G. E. Novalux Lighting Units, are being widely used to replace unsightly wooden poles, to eliminate duplication of facilities and to reduce costs.

Patented Wire Lock Swedge Joint



The edge of the outer tube is chamfered, so that water can not rust the pole at this joint. It is impossible for poles made up in this manner to telescope at the joints, either by overloading or by the drop test.



The Electric Railway Equipment Co.

Cincinnati, Ohio

New York Office: 30 Church Street

Standard Types of

NATIONAL PNEUMATIC Door Engines

used by leading surface and rapid transit electric railways of America









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Legend tells us that wood preservation was first practiced in the Valley of the Nile, 3000 B. C. More modern methods of treating began about 300 years ago. As a result of much experimenting, the pressure-vacuum process of preserving wood was perfected. Wood preserved by this process has stood the test of time!

Long-Bell

Creosoted Yellow Pine Poles

are made resistant to decay, fire and other destructive elements by this highly efficient pressure-vacuum process, using the best grade English Creosote Oil as a sterilizing preservative. This oil is forced by pressure into the sapwood, thoroughly sterilizing it. A vacuum then draws out the surplus oil.

Long-Bell Creosoted Poles serve long and well. They reduce replacements and repairs to a minimum. Public utility companies which have adopted them find they reduce maintenance costs.

Get further information! Learn how Long-Bell Creosoted Yellow Pine Poles will save you money. Send for "Poles That Resist Decay", our booklet which fully explains these better poles.

The Long-Bell Lumber Company

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Creosoted Yellow Pine Poles; Highway Guard Rails and Fence Posts; Ties, Timbers, Lumber, Piling and Wood Blocks.





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ERICO

Portable Railbonding Equipment

For BRAZED or ARC WELD Railbonding

A rugged bonding equipment easily handled with little effort, by two men. The combined weight of the Series Type Rheostat and Larry is only 245 lbs. The Rheostat alone weighs only 145 lbs.

For Brazed Bonding the 600-650 volt Series Type Rheostat, mounted on a wheeled larry, governs the current drawn from the trolley wire thru the sectional Pole, Fuse and Breaker. The Portable Welding Furnace converts this current to heat, uniting the Brazed Bonds to rail, previously cleaned by the Portable Grinder.

For Arc Weld Bonding, five current taps on the Rheostat permit flexible current control. An Arc Weld Pencil Holder with Lead and a Shield are the only additional equipment required for welding.



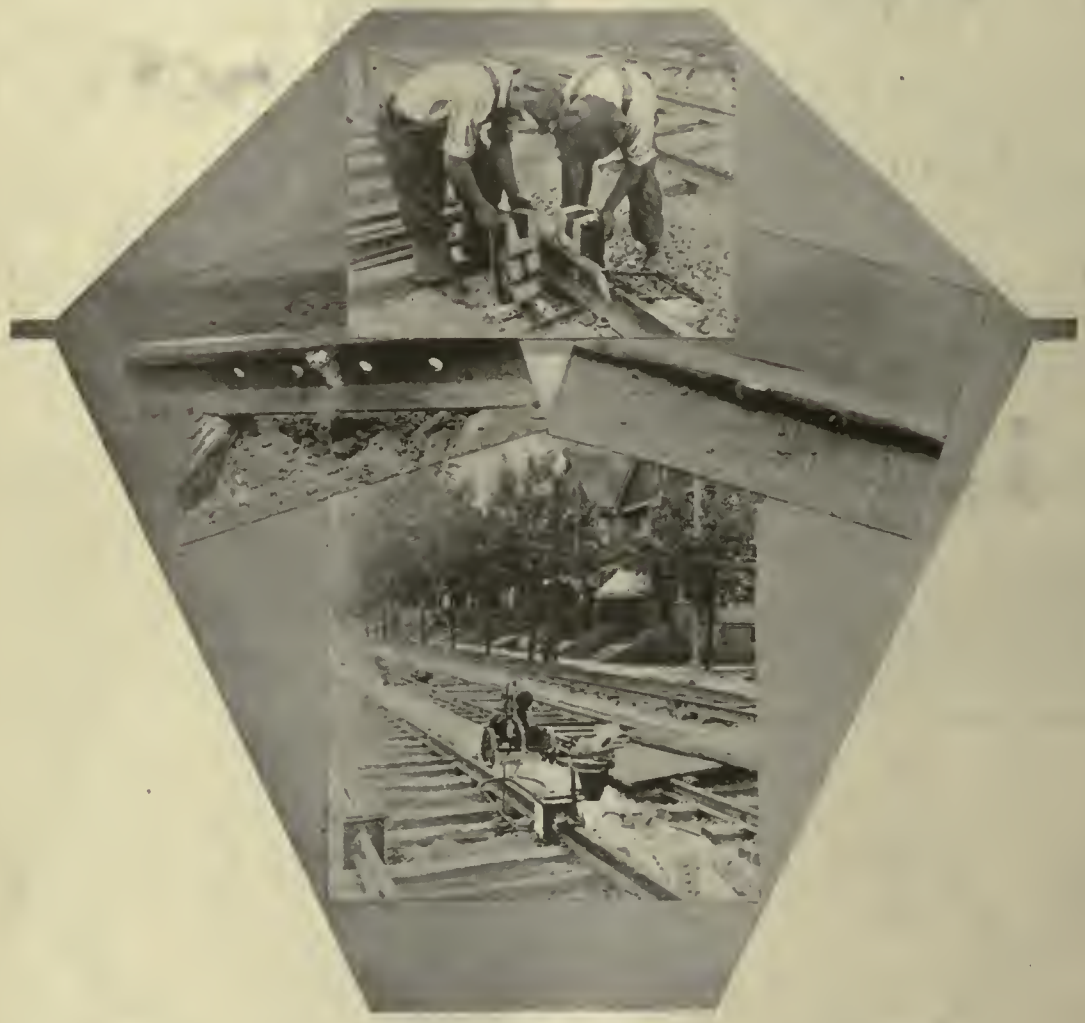
The Erico Portable Series Type Arc Welding and Bonding Outfit accomplishes Brazed Bonding just as effectively as the Erico Bonding Cars, the satisfactory and reliable bonding performance of which is well known thruout the electric railway field. The portability, simplicity of operation, and ability to do any kind of arc welding are advantages that characterize the Portable Series Type Outfit.

The Electric Railway Improvement Co.
Cleveland, Ohio

ERICO makes
The only Brazed Bond
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GOOD BONDING PAYS

THERMIT RAIL WELDS



In Milwaukee

after ten years' service they say this—

"This company is using Thermit Welds for track joints, and the oldest joints placed are now 10 years old and are showing excellent wearing qualities with low maintenance cost."

Maintenance Costs Practically Zero

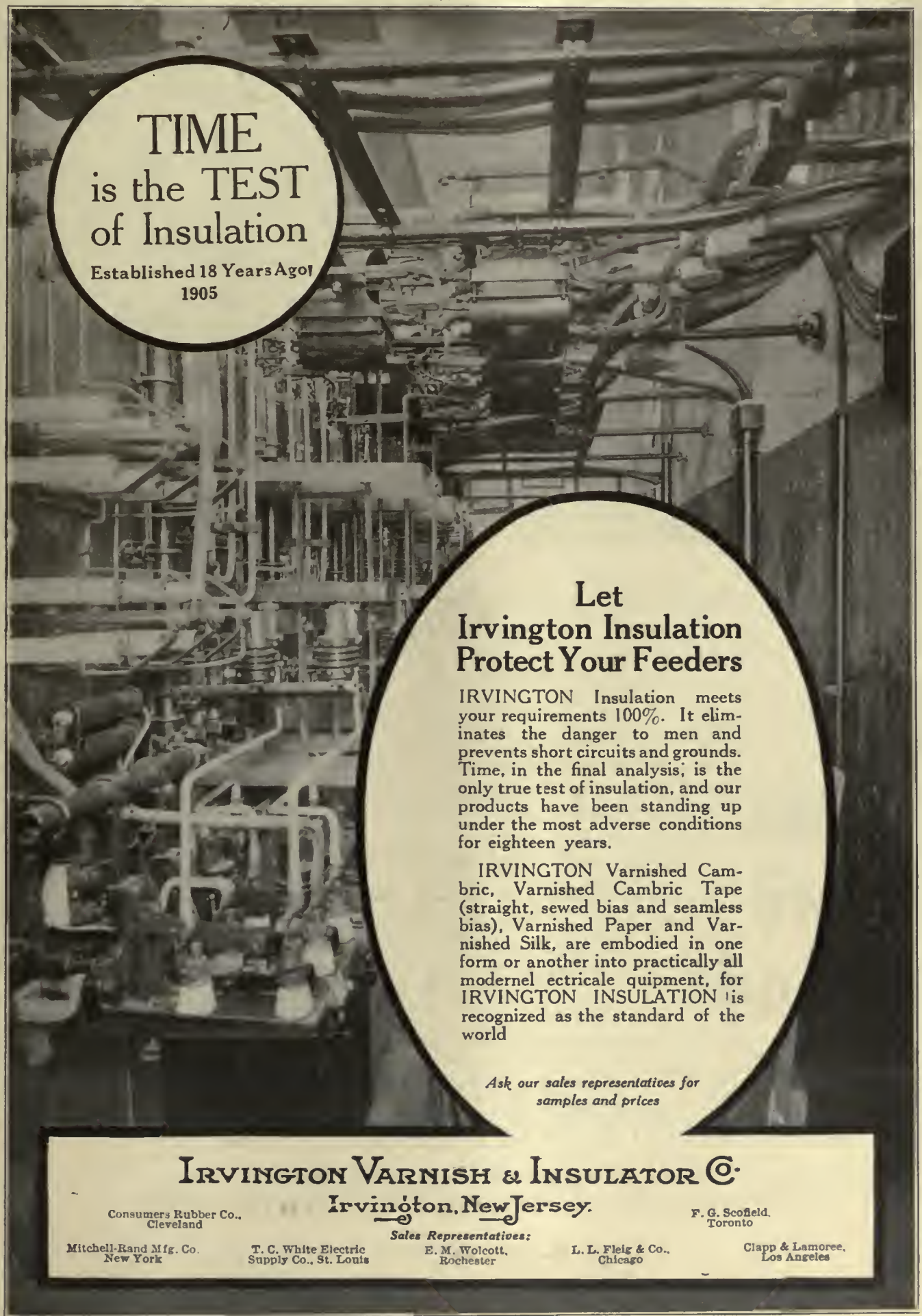
because they result in the elimination of the joint at rail ends, thus forming a continuous piece of rail. They do not cup nor work loose, neither do they require any copper bonds to conduct the return circuit. Once installed you do not have the unpleasant duty of periodically cutting away and replacing expensive pavement to effect repairs. There's nothing about a Thermit Insert Rail Weld to repair. It changes a joint to a solid piece of rail—see illustrations above.

The first cost is the last cost and it will surprise you to find out how low the first cost is.

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TIME is the TEST of Insulation

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Let Irvington Insulation Protect Your Feeders

IRVINGTON Insulation meets your requirements 100%. It eliminates the danger to men and prevents short circuits and grounds. Time, in the final analysis, is the only true test of insulation, and our products have been standing up under the most adverse conditions for eighteen years.

IRVINGTON Varnished Cambric, Varnished Cambric Tape (straight, sewed bias and seamless bias), Varnished Paper and Varnished Silk, are embodied in one form or another into practically all modernel ectricale quipment, for IRVINGTON INSULATION is recognized as the standard of the world

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One Minute

Una Rail Bonds

In just one minute, the above all copper Una Bond was welded direct to the steel rails. This is also the average welding time for all 4/0 Una Bonds including the cable types. With this speed of welding, it is not at all uncommon for 150 bonds to be installed daily—in fact, many Una Bond users report a much higher number applied per day on continuous bonding. This is a big factor in securing low bonding installation costs.

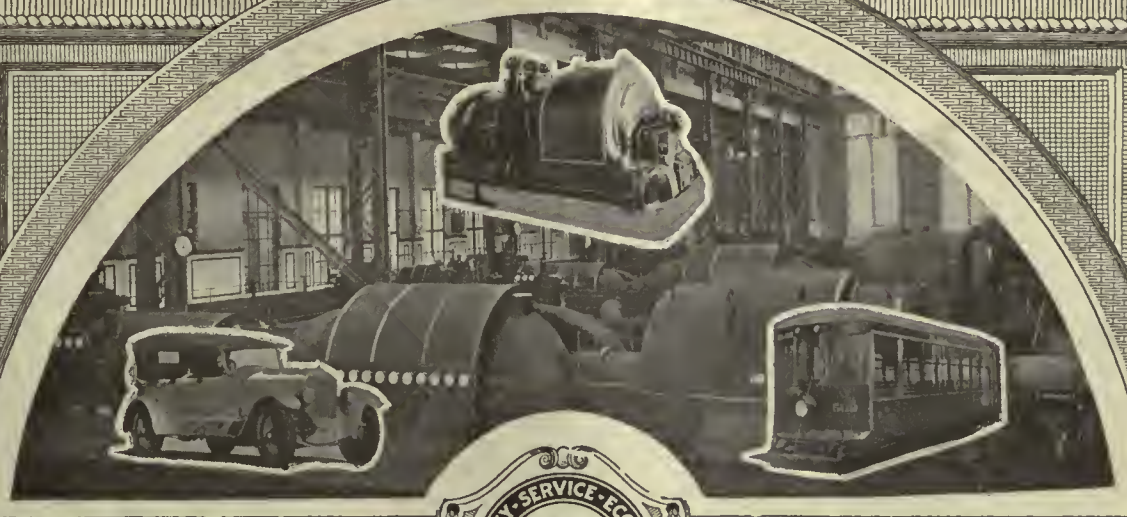
To weld a Una Bond direct to the rails is just as simple as it is quick. It is not necessary to grind the rails. The bond is simply placed in a mold against the rails. Then with an electric arc, from either an RWB Dynamotor or resistance welder of ample capacity, the bond strands are melted together in the mold with Una Metal. Just as soon as the mold is filled, the bond is installed—a very simple indication to the operator. By the action of Una Metal, the oxides and scale are removed from the rail, leaving clean steel to which the copper welds. The gases formed are also eliminated, thus giving a fine grained, solid structure in the finished bond head. Actual tests show that by applying a steady shearing force to the bond head, it requires 25,000 to 32,000 lbs. to completely part it from the rail. Even then, the shear always takes place thru the head, leaving the weld of copper to steel intact. These tests clearly indicate the strength and permanence of Una Bonds.

By the welding of the all copper Una Bonds direct to the rails, a path of copper only carries the current from rail to rail. This makes power savings a maximum at every joint and assures full bonding value.

Many prominent railways use Una Bonds. Let us figure on your requirements now.

Rail Welding & Bonding Co.

Cleveland, Ohio



The Logic of Lubrication

In the operation of cars, engines and power transmission units, lubrication is first, last and always a *necessity*. It is not a matter of choice; without lubrication, your equipment is powerless—worthless.

But the quality and efficiency of your lubrication *is* a matter of choice. Not only the service you secure from equipment, but its own length of life, depends upon your selection.

The first cost of high-grade lubricants naturally must be more than that of the ordinary kinds, due to the higher priced materials and more complete processes that enter into their manufacture. The question to you must be, "Are they worth the difference?"

What is the opinion of the best engineering authorities on this subject? What is the advice given in the instruction book when you bought your automobile? *"Use the very best lubricant obtainable—it will pay you many times its difference in cost."* The more expensive the type of machine, the more truly this counsel applies.

Galena Oils are the highest grade street railway lubricants manufactured. Their matchless efficiency and ultimate economy are shown in their splendid service on hundreds of electric railways and power plants in all parts of the United States.

These properties do not consider Galena Oils a luxury, but *Galena lubrication a necessity* to efficient operation. The small difference in cost is not looked upon as an expense, but as an *investment*, that has invariably returned large dividends in better service and decreased maintenance costs.

"More miles to the pint,
Better service to the mile!"

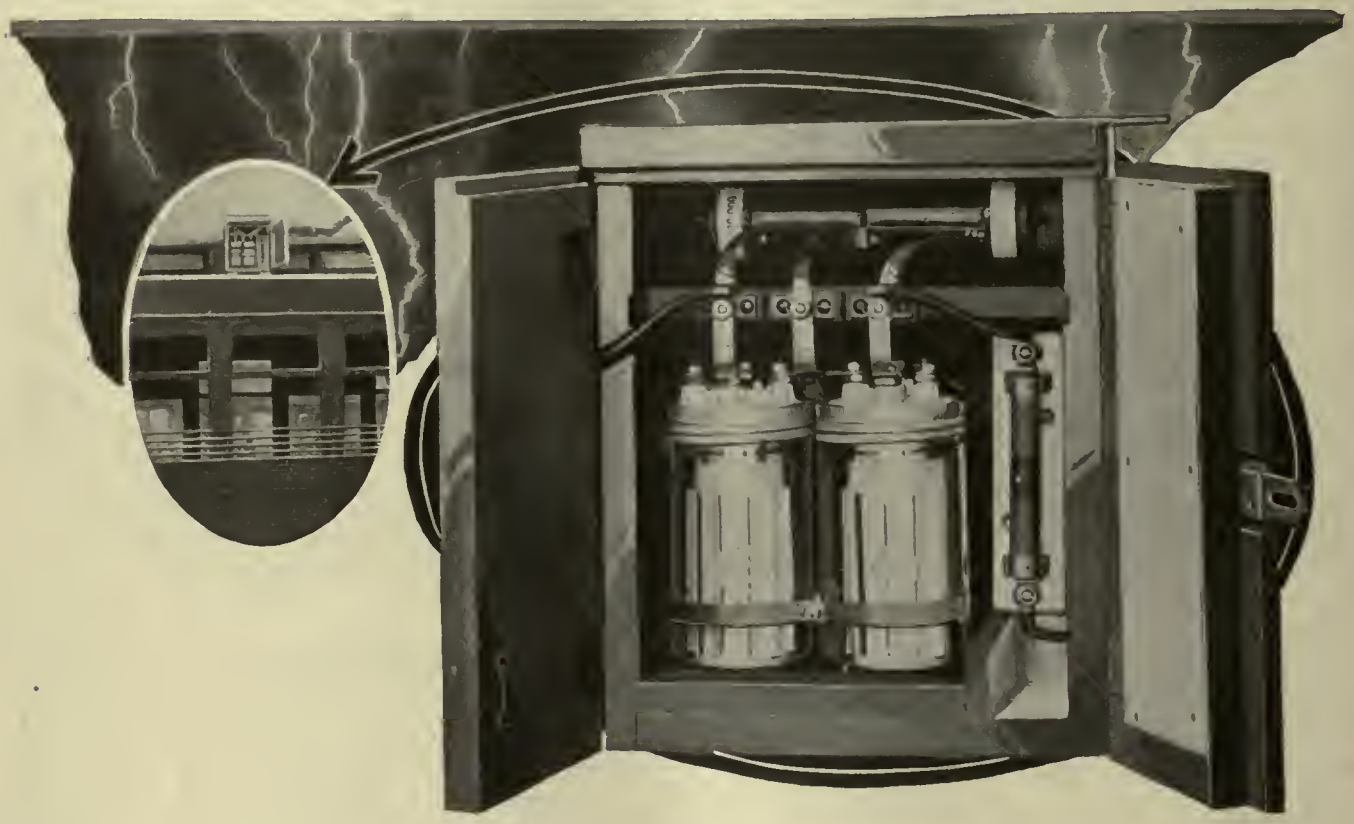
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Do you know what lightning costs you?



Consider, too, your service

While searching for every means to cut down maintenance costs, have you considered eliminating repair bills for damages from lightning?

Service records show that our D-C. Aluminum Arresters will prevent practically all lightning damage to car equipments. For instance, on 50 roads with 5000 cars equipped with them, there were only 43 cases of slight damage from lightning during a whole year—averaging less than one per railway and less than one for every hundred cars. Some of these equipments have suffered no damage from lightning for several years since the arresters were installed.

Such facts are significant. They call for a study of your maintenance records. And probably you will find one item of expense that the D-C. Aluminum Arrester can save you.

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38-B

ELECTRIC RAILWAY JOURNAL

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Company, Inc.

HENRY W. BLAKE and HARRY L. BROWN, *Editors*

Volume 61 New York, Saturday, April 21, 1923 *Number* 16

Electric Furnace an Economy for Maintenance Repairs

PARTICULAR interest attaches to the installation of an electric furnace in the shop of the Lehigh Valley Transit Company, Allentown, Pa., described in this issue, and the economies effected thereby.

While the general practice of manufacturing parts by an electric railway, where any considerable quantity is needed, is a very questionable economy, the very high cost of an order for a few castings of any kind is practically forcing electric railways to undertake the manufacture of these miscellaneous parts. Very few manufacturers are interested in taking these small orders, and the prices which they quote are rather clearly designed to discourage them. As a direct evidence of this the Steel Foundrymen's Association recently met in Pittsburgh and put the base price on steel castings up to 50 cents a pound on small quantities.

It will frequently cost as much to negotiate purchases, to inspect the work, to pay freight on patterns two ways and on the new casting one way, as the entire cost of the molding amounts to when done by the company itself. The railway must keep its equipment in operating condition, and where long delays are involved, as is often the case when buying these miscellaneous parts, emergency repairs have to be made, and in such cases the work is really done twice.

The Lehigh Valley Transit Company has found that the use of an electric furnace for such miscellaneous repairs has enabled it to do much useful work with a very small outlay of money. Furthermore, this has been accomplished on a property where at the outset the men were entirely without steel or iron foundry experience.

An important economy in this home casting of parts results from the fact that electric railways have large quantities of scrap, which as a rule is sold for small prices. Axle and tire turnings bring from $5 to $10 a ton. This scrap is excellent material for melting into high-grade castings which run from 50 per cent to 100 per cent stronger than cupola iron castings. A large reduction in the number of replacement castings required has resulted from the use of steel in place of iron, and as these steel castings are produced at less cost than that for which iron castings can be bought, the latter product has ceased to be of interest.

Extensive manufacturing of parts used in considerable quantity is usually done by the electric railway with fictitious economy. Either the railway does not know what its costs are or it is producing an inferior product, which will usually result in earlier and more frequent necessity for replacement, involving expense quite offsetting the seeming economy in a lesser first cost. But limited manufacture for maintenance repairs seems to have a real justification and to represent a real economy. In this work, the experience of the Allentown company would indicate that the use of the small electric furnace, with which castings weighing up to 1,000 lb. can be produced, will be found to be a great convenience and a valuable investment.

There Is Economic Necessity Behind the Wood Preservation Movement

TIMBER is being cut in this country much faster than it is being replaced. While there is still a large reserve it is going fast, and it is up to the wood-consuming industries to be familiar with all of the means available for getting the greatest possible length of life from the timber which they use. It is difficult to get this idea over unless the relation between the depletion of the timber reserve and the accompanying increase in timber cost is driven home, or unless the use of preservative methods brings about a demonstrable lessening in annual cost. No amount of abstract sentiment in favor of conservation of national resources will bring about a change in practice unless this comes through legislative enactment.

However, the reaction of depletion on prices is reasonably prompt, and important timber users are beginning to see that preservative treatment must be adopted eventually, if not now. An increasing number believe in doing it now.

Electric railways use vast quantities of wood in the form of ties, poles, bridge and trestle timbers, buildings, etc. Much of this is exposed to alternate wetting and drying under the action of the weather and thus needs protective treatment of some kind. This may be anything from a simple brush treatment with creosote or carbolineum at one extreme to an elaborate pressure treatment with these antiseptics at the other. Whatever the treatment is it will do some good, and if circumstances permit, the use of the more expensive treatment is to be preferred because in general it insures the longer life, and the longer a piece of timber lasts the less the replacement cost in terms of annual expense during its life. Brush treatment, however, is better than nothing and may lead to better practice.

Another item, sometimes lost sight of, is the fact that timber now installed at a given cost will probably cost more when replaced at the end of its life, or must be replaced with inferior material, or both; hence the economy of long life.

The American Electric Railway Engineering Association has at work this year a special committee on wood preservation. Heretofore the committee on way matters has handled the subject, but it has grown to be important enough for specialized attention. The main purpose of this committee is educational; to show the industry exactly what the facts are. The result should be increased interest, as evidenced by larger appropriations for making timber last longer.

Paint and Publicity Help to Draw Patronage

FOR years the Manhattan Elevated lines have been giving service to New York's multitudes. Year after year the cars and structures have become dingier and dingier. The company is not altogether responsible for this. Mayor Hylan's influence excuses it of much that might seem to be shortcoming. But it is not surprising that the public began to desert the "L" when the subway was opened, with its seeming greater speed because of the noise and the fleeting walls close to the windows. The growth of the elevated traffic has not kept pace with that of the newer system. So much attention has been given the subway that the "L" has been almost forgotten, relatively, by both management and public. Furthermore, service has been curtailed so that crowding is as severe as on the subway.

Now that the financial relations between the companies have been readjusted the management has found that much can be done to increase the capacity of the elevated system. So, to develop the "L," and perhaps to relieve the subway, some 428 trains have just been added to the daily elevated schedule and express service extended from rush hours only to the entire day.

Also, a campaign has been started by the company to induce riding. The slogan "Ride on the Open Air Elevated" has been adopted. More aggressive is the adoption of a bright color scheme of orange and black to replace the combination of grime and brake-shoe dust which has long featured the car exteriors. Doubtless it will cost more with these colors to keep the cars looking well, but it is worth the price. Railways that have adopted such a policy have usually been more than repaid by more riding, improved relations with the public and better morale among employees.

"Paint, Publicity and Politeness" might well be adopted as a motto on more than one property.

Header Wall Construction for Track Paving

AS A further chapter to the editorial published in the Nov. 18 issue entitled "The Square Deal in Regard to Track Paving," it appears from the article on page 677 that at least two of the various state highway departments, those of New Jersey and Pennsylvania, in co-operation with a local electric railway, have adopted improved construction for reducing their troubles. The respective obligations of construction and maintenance in track and roadway areas are now well defined, however inequitable the various utilities may consider them. The continual improvement in design and replacement of types of track and track pavement shows the good faith and fair intent of the utilities to spare neither time nor money in the development of types of construction which will be effective in obviating trouble.

Impact is incidental to operation of car wheels over rails, and the track in paved streets will transmit vibrations from the rails to the pavement within the track area and thence to the adjoining street pavement as long as complete isolation is not effected between the track and roadway area. The State Highway Departments of New Jersey and Pennsylvania have come to the conclusion that, whatever the type of construction in track areas, whether these be rigid or semi-rigid some form of effective isolation must be provided. The relatively slight additional cost involved in the changes from standard construction is more than offset by the factor of the desirable insurance of a maximum of protection and a minimum of maintenance. It is obvious that any isolating agency or barrier to be effective must be independent of the vibrating track and its constituent parts, the paved strips adjoining the rail, which are in more or less immediate contact with the underlying ties. By the use of a barrier incorporated with the roadway slabs an opportunity is found to kill three birds with one stone. These are to protect the slab foundation from vibration, substantially to reinforce the edge of the slab and to add a very desirable element of insurance against damage by frost.

Competition as a Regulator of Fares and Service

THE advantages to all concerned when city transportation is a regulated monopoly are so evident that a reversion to the competitive plan seems a backward step. When the only public transportation was furnished by electric cars the danger of a departure from the monopoly plan was remote, because it was not easy to start a competitive line. Usually the best streets were practically pre-empted by the existing transportation system, and it was usually in such a position that it could offer to passengers a much more extended ride by a transfer system than was possible for a new company. Moreover, considerable capital is required to build an electric railway of even moderate length, and the financial institutions to which application for any such enterprise would have to be made would be apt to be conservative in regard to embarking in a competitive electric railway. The development of the autobus has changed this situation. In some cities, notably New York, there has been much talk recently of the starting of bus lines on routes competitive to electric railways, and it is often difficult to convince merchants and others, who have been used to competition in their own lines of business, that monopoly is the best plan for local transportation.

It is an interesting coincidence that the question of monopoly versus competition as regards bus service is an active one in London as well as in New York, though in somewhat different form. In its bearing on this point and also the general subject of regulation versus competition the remarks at the meeting on Feb. 22 of the London General Omnibus Company of Lord Ashfield, well known in this country, are of interest. He said, in part:

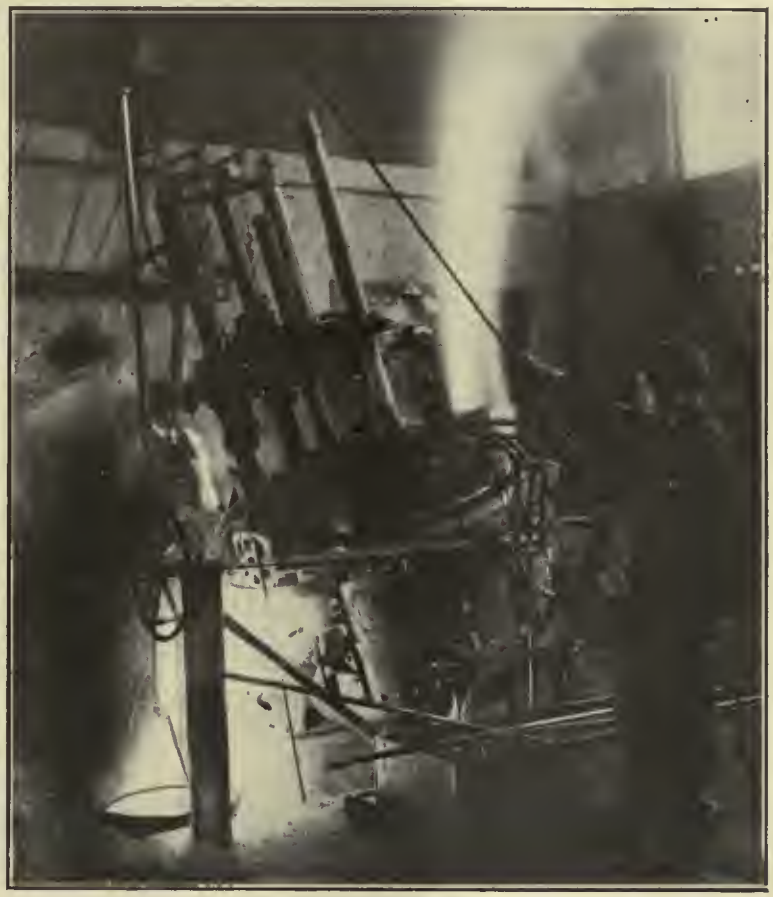
> Competition is a dangerous weapon. It may seem to offer immediate gains, but they are at the expense of future losses. This is the universal experience. Competition causes congestion on the more remunerative routes, destroys reliable services on the less remunerative routes and curtails the unremunerative routes. Competition weakens the undertaking, so that the fresh capital required for progress cannot be obtained on reasonable terms, and therefore becomes a greater burden upon the passengers who ultimately have to meet the interest charges in the fares paid. The improvements which your companies are now making are a sure consequence of the measure of prosperity which has at last come to them. Is it all again to be cast away? Competition ends in obsolete vehicles being retained in service, when they should have reached the scrap heap, and this means a poor, slow service instead of a fast one.

Much has been said in political circles in New York State and city recently about the merits of bus competition, but here is direct evidence.

Reducing Railway Maintenance Costs with an Electric Furnace

The Lehigh Valley Transit Company, Allentown, Pa., Has Been Making the Steel Castings Necessary for Its Maintenance Repairs for Two and One-Half Years, and, in Addition to Obtaining Economies, Has Reduced Departmental Work

THE need for an electric steel furnace by the Lehigh Valley Transit Company, Allentown, Pa., for making various castings became apparent during the world war. At that time it was almost impossible to obtain steel or iron castings in the small quantities necessary for maintaining electric railway equipment, and even where manufacturers accepted orders the best delivery that could be obtained was from six to twelve months, using United States priority influence. The prices asked for castings during this period were exceptionally high, and the long time required for delivery made some emergency measures necessary in order to maintain service on the various railway lines. The installation of an electric steel furnace was thus given consideration by the officials of the railway for producing emergency castings and particularly for making a quantity of wheel bushings which were necessary. The practice of the railway, whenever wheels became worn to small diameters and still had sufficient metal for additional service, was to remove these wheels and re-turn them for smaller axles for use under cars using smaller diameter wheels. This practice required a steel bushing between the axle and the wheel in order to provide proper fit. At that time old steel scrap was selling at from $16 to $20 per ton and, considering the high price asked for steel castings, the officials thought they would be able to produce wheel bushings and emergency castings by using the old scrap at such a low cost as to be able to pay for the furnace in a very short period. An order was accordingly placed with the Pittsburgh Electric Furnace Corporation for a 500-lb. "Lectromelt" furnace. This furnace was received Oct. 1, 1920, and was placed in operation immediately so that the first casting was made Oct. 21.



Pouring Steel Into a Ladle from the Electric Furnace

When the question as to the size of furnace to be purchased was first considered, it was thought that the 250-lb. size would be satisfactory, but further consideration of the weight of other castings which were required showed the necessity of the 500-lb. size. In order that the usefulness of the furnace could be demonstrated before an excessive amount of money was used, the first installation had hand control, but provision was made in the installation so that automatic control could be added without difficulty. From the start the furnace was kept busy making small steel castings and the sizes produced gradually increased. After about a year's operation its great value was seen and the economies showed that automatic control should be installed. Accordingly, a Westinghouse type control board was purchased from the Pittsburgh Electric Furnace Corporation.

Automatic Control Installed

In addition to the electric furnace itself, other equipment necessary consists of a 200-kva. Pittsburgh Transformer Company's transformer. The power supply is three-phase, 2,200-volt, and the transformer used is both oil and water cooled. The secondary side of the transformer has low and high voltage taps. When beginning a heat the low tap is used for about five minutes, necessary connections being obtained from the switchboard by throwing a handle. After contact has been established the high tap is used to accelerate melting and after the melting is completed the low tap is again used.

The regulator panel carries the control element, the magnetically operated switches which control the electrode motors, and the necessary resistances, condensers, switches and fuses, etc. A small rheostat is mounted on the back of the panel for each electrode which the regulator is to control, and is connected in the voltage-





Auxiliaries to Steel Foundry Reduce Cost of Castings







No. 1—The sand mixer is an efficient help in making molds.

No. 2—The core room and baking oven are necessary auxiliaries.

No. 3—The control board provides for automatic regulation and shows what is taking place in the furnace.

No. 4—Making a mold for a steel wheel by aid of the molding machine.

No. 5—The automatic control equipment is housed in a separate brick room.

No. 6—Turning a pair of cast steel wheels on a wheel lathe adjacent to the company's foundry.



coil circuit. Its purpose is to limit the maximum current for which the rheostat on the control panel can be set. It also provides a means of balancing the current between electrodes for any setting of the rheostat on the control panel.

The regulator is particularly rapid, since an electrode speed of 2½ to 3 ft. per minute is possible under automatic control. The current can be held to within 5 per cent of its normal value. The furnace with a cold charge of steel can be placed under automatic regulation with the rheostats set at full power, and at the end of eight to ten minutes a sufficient pool of steel will have been formed to give stable electrical conditions. The freedom from having to watch regulation of the furnace allows the melting crew to give its entire attention to the metallurgical aspect of melting.

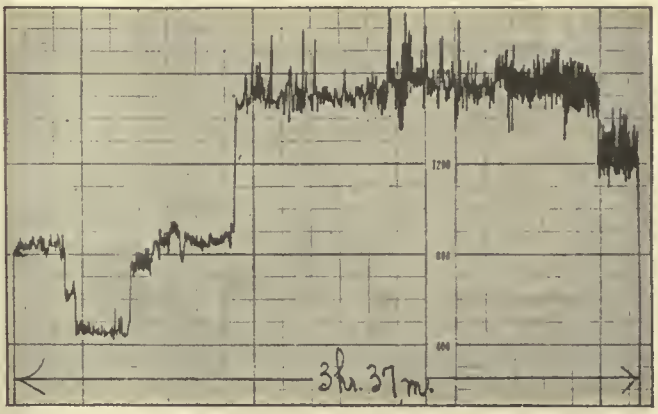
The steel is melted in the furnace from an electric arc between three graphite electrodes and the metal itself. The graphite electrodes are 3 in. in diameter and are supported by three water-cooled glands. One hundred and thirty volts a.c. is used for melting.

The lining of the furnace used by the Lehigh Valley Transit Company is of the acid type. Silica brick is used for both sides and roof with a ganister bottom. The furnace tub is constructed of plate steel and rests on rocker castings, so as to permit the necessary tilting for pouring. The furnace has a front spout for pouring and a charging door in the rear for loading with scrap. This rear door is also used for removing slag and for inspecting the metal during the operation of the heat.

The automatic control equipment, together with the 200-kva. transformer and a motor-generator set, is housed in a brick compartment built in the corner of the shop. This room is approximately 15 ft. square. The motor-generator set is used for supplying direct current at 220 volts to operate the various solenoids on the automatic switchboard. The control panel with necessary meters and switches is built into this compartment with the face of the control board immediately back of and to the right of the furnace. Accompanying illustrations show the interior of the control room and also the control panel, which is on the outside. The three heavy cables which reach from the wall to the furnace conduct the current to the electrodes. In addition three flexible connections conduct the water along these cables and through the glands which surround the electrodes. The connections are made so that the water passes in series through the various glands, after which it returns to a drain pipe at the wall and runs into the sewer. The tilting of the furnace is accomplished by turning a hand wheel which operates the necessary gearing for tilting as required. This tilting screw is operated by hand and pours the contents of the furnace into the ladle. From the ladle the metal is poured directly into the sand molds, which are placed within convenient radius so that they can be reached readily with a jib crane of 2-ton capacity, which serves the foundry floor, handling the ladles, castings, mold boxes, etc.

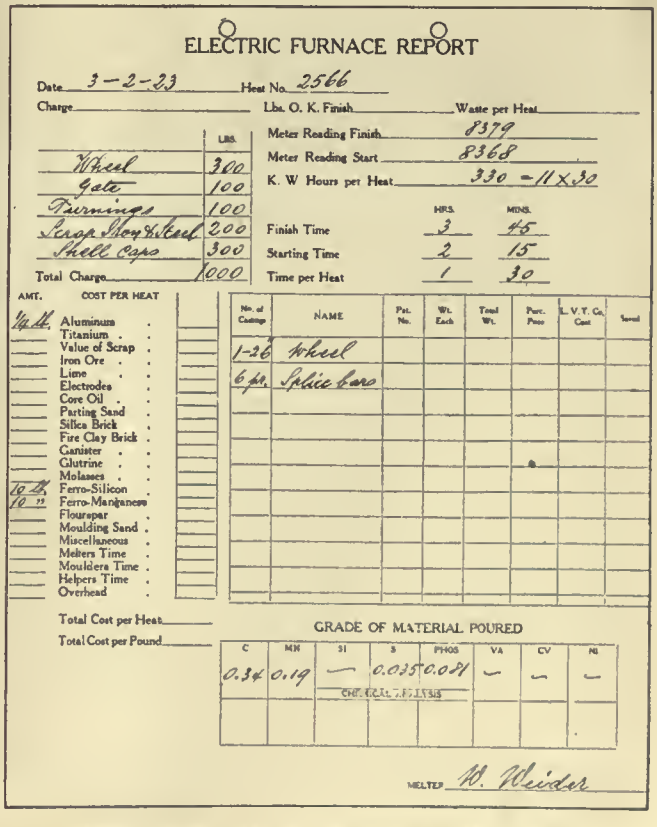
Use Made of the Furnace

The first use made of the furnace was to supply necessary wheel bushings and small castings. In the first two weeks of operation a year's supply of steel bushings could have been made up, and figuring the cost of the bushings at that time, which, as already stated, was exceptionally high due to war conditions, a saving was found sufficient to meet the entire first cost of the furnace. The field of usefulness for this furnace in supplying castings for emergency repairs was soon found to exceed all expectations. The maintenance of electric railway equipment requires a large number of castings, which are essentially not wearing parts and so are required in small quantities, the requirements often consisting of from one to less than ten castings at a time. Manufacturers apparently are not looking for this type of business and direct their attention particularly to obtaining orders where large quantities of the same castings are required. Consequently the prices asked for castings of this nature, singly or in small quantities, are exceptionally high.



Graphical Chart of Power Input of Electric Furnace

In many cases these castings are required for old or obsolete equipment, so that the manufacturers have to make up new patterns, and as the quantity required is small, of course this increases the price considerably. There is also a very long time required for the making of the pattern and the producing of the casting, so that even where particular attention is given toward



ELECTRIC FURNACE REPORT

Date 3-2-23 Heat No. 2566

Charge Lbs. O. K. Finish Waste per Heat

	LBS.
Wheel	300
Gate	100
Turnings	100
Scrap Steel & Iron	200
Shell caps	300
Total Charge	1000

Meter Reading Finish 8379
Meter Reading Start 8368
K. W. Hours per Heat 330 - 11 x 30

	HRS.	MINS.
Finish Time	3	45
Starting Time	2	15
Time per Heat	1	30

AMT.	COST PER HEAT
½ lb.	Aluminum
	Titanium
	Value of Scrap
	Iron Ore
	Lime
	Electrodes
	Core Oil
	Parting Sand
	Silica Brick
	Fire Clay Brick
	Canister
	Glutrine
	Molasses
10 lb.	Ferro-Silicon
10 "	Ferro-Manganese
	Flourspar
	Moulding Sand
	Miscellaneous
	Melters Time
	Moulders Time
	Helpers Time
	Overhead

No. of Castings	NAME	Pat. No.	Wt. Each	Total Wt.	Perc. Poss	L. V. T. Co. Cast	Saved
1-36	Wheel						
6 pr.	Splice bars						

Total Cost per Heat
Total Cost per Pound

GRADE OF MATERIAL POURED

C	MN	SI	S	PHOS	VA	CV	NI
0.34	0.19	—	0.035	0.041	—	—	—

CHEMICAL ANALYSIS

MELTER W. Weider

Report Blank Used in the Electric Steel Foundry

In many cases these castings are required for old or obsolete equipment, so that the manufacturers have to make up new patterns, and as the quantity required is small, of course this increases the price considerably. There is also a very long time required for the making of the pattern and the producing of the casting, so that even where particular attention is given toward

delivering these as soon as possible, the time still remains exceptionally long. In many cases orders for small quantities are not followed up to obtain short deliveries, so that frequently railways wait from six to twelve months for castings that are quite essential to give satisfactory operation. This has left many roads to undertake emergency repairs by welding or patching up parts so that the equipment can continue in service until the new part is received. This method of maintenance requires double the labor as the equipment has to be brought in for making the emergency repairs and then has to be again shopped for the installation of the new equipment when it is received. Sometimes the material after it is received is not found satisfactory and must be returned, and frequently entirely new castings must be made. By having a small electric furnace, the railway is relieved of a wonderful amount of worry and trouble, and in addition by making the castings themselves the railway obtains fairly correct material at a very low figure.

In Allentown castings for emergency repairs are produced and placed in service in much less time than it would take to put through an order. In order to take care of the emergency repairs, railways are carrying stocks of material, some of which are not called for over long periods. By being able to make such castings themselves, the stores department is thus relieved of the necessity of carrying large amounts of material, which on some systems run into many thousands of dollars. Much unnecessary correspondence is also prevented. Thus, in placing an order it is usual first to ask for bids, and after these have been checked by the various departments there is considerable routine work necessary to place the requisition, order, invoice and payment in operation. Frequently much additional correspondence is necessary before the castings are received, and where these are found unsatisfactory additional work is entailed. In addition to relieving the various departments of this work, the cost of trucking castings from the freight station to the shop is done away with, and also the payment of necessary freight bills.

The big field then for the use of a small electric furnace appears to be in taking care of such requirements as are essentially a maintenance proposition rather than a manufacturing proposition. Of course, where large quantities are required, manufacturers are in position to turn out the work much more speedily and the cost should be less and the product superior.

Amount of Work Done in Allentown

During the two years and a half that the electric steel furnace has been in operation in the shops at Allentown 2,600 heats have been completed, and the operators have been particularly successful in producing steel castings of a very fine quality. At first considerable attention was given to tests and to the analysis which would show the grade of material poured, but experience has enabled the operators to tell in advance the various metals required in the charge to give the material desired. The foundry force at present consists of twelve men, and six heats are poured per day. While the furnace is a 500-lb. size, it is being continually overloaded, and heats of from 600 to 800 lb. are being poured constantly. In emergency cases castings weighing 900 and 1,000 lb. have been made. The number of heats that could be made per day could be increased from these figures if necessary, as it is found that the first can be produced in approximately one hour's time and following heats can be run off at from forty-five to fifty-minute intervals.

The material used for charging the furnace in Allentown is entirely old scrap, such as scrap wheels, steel turnings, machine shop turnings, old brake shoes, or whatever scrap may be on hand. Of course, the various parts and quantities which constitute a charge are carefully selected so as to give the desired grade of material. The large scrap parts, such as wheels, have to be cut up into pieces approximately 12 in. square. This is done with an acetylene cutting outfit. In charging the furnace at Allentown large chunks of metal are usually placed at the bottom with some fine turnings on top. The melting process is thus started more easily and the arcs which melt the metal play between the electrodes and the metal itself. When the metal is hot necessary additions are made as required. The various quantities of scrap are carefully weighed before they are placed in the furnace.

Large Variety of Castings Made

A list of the castings made in the steel foundry of the Lehigh Valley Transit Company would occupy several pages. Some of the principal ones include such castings as brake hangers, brake shoe heads, third rail shoes, gusset plates, center plates, side bearings, clevices, filler blocks, bushings of all descriptions, bearings, housings, door step treads, spring seats, several types of brake jaws, truck guides and steel wheels. As required, of course, all necessary castings can be turned out, which electric railway operators will appreciate include a very large variety. In addition to the equipment used for rolling stock repairs, the foundry in Allentown also makes filler blocks, sewer grates and miscellaneous track department castings, among which are several complete special trackwork parts. A description of the manufacture of these will be described in another article. A large variety of castings is also made for the line department, and, in fact, the electric steel furnace provides castings for all the departments of the railway. The Lehigh Valley Transit Company has two amusement parks, and there is a large variety of equipment in these which require maintenance, and the steel foundry has been found of particular value for these.

An undertaking of this kind by an electric railway, which is quite out of the ordinary, of course, has been followed very closely by the management, and detailed costs have been made very carefully and conservatively so as to make certain that no one was misled as to any economies produced. These costs show that during the period of operation steel castings have been produced at such a low cost that cast-iron as a material for the railway has really ceased to be of interest, since the steel castings produced are much stronger and more reliable than either malleable iron or the cast iron which has heretofore been used in the electric railway maintenance. The malleable iron market has been very irregular during the past few years. Prices were high, and deliveries very unsatisfactory and irregular.

Some of the beneficial results obtained from replacing cast iron with steel are of interest. The track department uses a considerable number of grates for sewer covers, which were previously made of cast iron. The practice was to order these from a particular manufacturer who had patterns for the type and size required, and so no consideration was given to the material used. With the introduction of the steel furnace

some grates were made for replacement in the steel foundry. At first a considerable number were required for replacement, but the orders for new grates decreased quite rapidly. An investigation showed that maintenance replacement consisted entirely of replacing broken iron gratings. By the use of steel the gratings did not break and so the demand for new castings decreased as the number of steel gratings increased. While these gratings were no doubt of sufficient strength when they were first introduced, the increase in traffic and in the capacity of trucks which operate through the streets made them of insufficient strength to withstand the increased load.



Steam Road Crossing Cast in Company's Steel Foundry
Test pieces shown at back. The bent projections of that at left resulted from blows with a sledge and show ductility of castings.

Another example of the beneficial results obtained from replacing cast iron with steel is in connection with the wedges for journal boxes. When the steel foundry first started to make these there were orders for a considerable number, and so the wedges were made up in advance and a few were kept ahead to fill orders as they came in. Eventually it was discovered that the supply kept on hand was not decreasing, and an investigation was made to find out the cause. It was found that the original replacements of these wedges were due to breakage of an end lug which was of small section and that very few were replaced for being worn out. The use of steel gave additional strength to the end lugs, so that these did not break off, and consequently the number of replacements decreased considerably as the new wedges were installed.

When the steel furnace was first installed, wooden molds were used and the tamping was done by hand. Gradually wood has been replaced by steel and a molding machine has been added to the equipment so that the tamping is now done by compressed air. This, of course, results in increased economy and also permits the use of unskilled labor, while a certain amount of experience was required for the hand tamping. Experience has shown that no particular skill is required in the operation of the electric furnace and that aside from having a man in charge with a knowledge of the composition of the various steel castings used by electric railways, and one experienced molder, who takes care of the difficult work and serves as a leader for the others, unskilled labor can be used.

Other economies are gradually resulting from experience in connection with the work. Thus, in connection with risers and gates, at first some of these were of considerable cross-section, so that it was necessary to cut them off with the acetylene torch. A study of the construction of the risers has shown that the section at the castings can be reduced in most cases so that while a large body of metal is still retained in the riser, the reduced section at the castings permits of their being knocked off with a sledge.

The most complicated and difficult castings which are being made in the Allentown foundry are shoe heads, third rail shoes and journal boxes. A considerable number of cores are required for these castings, but in



General View of the Foundry, Showing How Large Jib Crane Serves Furnace and All Molds

spite of the additional labor involved, castings like these are being produced at about one-fourth the invoiced price at which they can be purchased outside. This 75 per cent saving does not include such savings as result from decreased stores and decreased work in connection with correspondence and auditing. A core room has been installed in a room adjacent to the foundry. Baking ovens equipped for gas heat are used.

MAINTENANCE REPAIRS TO THE FURNACE AND EQUIPMENT

During the two and a half years that the furnace has been in service the only repairs necessary have been relining the top side walls and the roof rings. At first the furnace was operated for 134 heats with the original roof rings. Later it was decided that the life of one set of silica brick was about 100 heats. The furnace consumes from 1 in. to 1½ in. of carbon from each electrode per heat. These two items are practically the only things against which maintenance charges have been necessary for the furnace since its installation. Other parts will probably last for many years, provided lightning or fire does not damage the transformer. In addition to the maintenance of the furnace itself, the ladles require relining. At present native clay is used for relining these, and it is found necessary to reline them about once in every two or three weeks. Mold boxes of course require repairs, but from the general observation, these are comparatively light, and aside from the items mentioned, the furnace continues in operation day after day with practically no other attention.

The performance and results obtained through the use of the electric steel furnace of the Lehigh Valley Transit Company have proved to all the officials that it is a very essential item for any electric railway. Through its use correct castings at a low cost are not only produced, but in a very short time and with little inconvenience, so that it is unnecessary to withhold the equipment from service to any considerable extent while making repairs.

The use of the steel furnace also enables the heads of various departments to make up special devices which result in labor saving and additional economies. As an example of this, the maintenance of way department has just constructed a new type of rail bender. This has proved a very efficient machine, and as a number of steel castings are used in this construction, the cost of these would have been prohibitive if it had been necessary to make up designs and have the patterns and castings made outside.

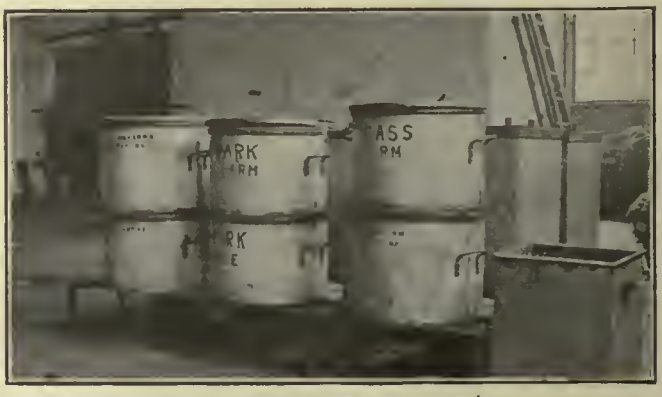
Waste Saturation Plant Halves Oil Consumption

The United Railways of St. Louis Is Obtaining Very Satisfactory Results from Its Oiling of Equipment Through Close Attention to Waste Saturation

AN EXTRAORDINARY, if not unique, lubrication practice is followed on the United Railways of St. Louis. Journal bearings, after they are once packed at the time a car is overhauled, are never lubricated by the addition of any raw oil, but are run until the next overhauling, a year or fourteen months later, when the journals are again repacked. During this period the bearings are of course inspected and the waste loosened and shaken up. It is necessary, however, to add oil to axles and motor bearings at each inspection.

Being able to follow such an unusual practice with respect to journal bearings is the result of thorough saturation of the waste with oil by means of a specially devised waste-saturating apparatus. Accompanying photographs and a drawing show how this waste-saturating plant is constructed and how it operates. The idea is to have the waste soak in the oil until it absorbs all the oil that it can hold. The saturating outfit is composed of two double bottom tanks filled with oil. The space between the two bottoms is filled with water, which is heated by means of hot water pipes to a temperature of about 125 deg. F. The waste is thrown into these tanks and allowed to soak from eight to twelve hours. At each end of the apparatus is a tilted draining pan that supports screens onto which the waste is thrown when it is removed from the oil. These pans are also heated with hot water pipes so that the same temperature is maintained during draining. The normal consumption of saturated waste is such that about two batches a day are turned out. The plant is heated with a small coal-fired hot water heater which is piped like a hot water heater on a car.





At Left, Sorting Out and Cleaning Used Waste for Resaturation. At Right, Covered Metal Cans for Dispatching Saturated Waste to the Various Carhouses

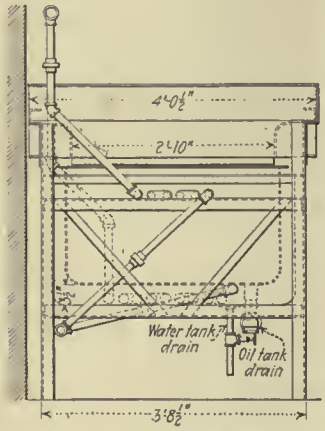
This apparatus, which is installed in the Newstead and Fairfax carhouse, has been in use for about six years. Previous to that time the waste used in packing all bearings was saturated with cold oil when used in each of the thirteen separate carhouses of the United Railways of St. Louis. This work is now centralized so that all waste used on the system is saturated with warm oil and sent out to the various carhouses as needed in covered cans holding 100 lb. each. Since



All Saturating of Waste Is Centralized in One Carhouse

the institution of this new system for handling and saturating waste the oil consumption has been reduced from about 4,000 gal. per year to about 2,000 gal. per year. This amount of lubricant is all that was required for all equipment, which was operated over 43,000,000 car-miles last year.

In the saturating process the new waste is not mixed with that which has been reclaimed. As mentioned before, the saturating apparatus is composed of two separate tanks. One of these is used for the new waste and the other for that which is to be resaturated. Only new waste is used in motor and axle bearings. This is packed in cans, which are plainly marked, for distribution to the various carhouses. Thus two grades of waste that must be kept separate are issued to each carhouse. The old waste from each carhouse is returned to the central saturating plant, where it is hand picked to loosen up the fibers and to remove the dirt. In sorting over the waste the longest fibers are thrown into a pile at one side, while the shorter ones are tossed into a perforated box which is immersed bodily in the oil. In this way it is not possible for the shorter pieces to separate from the rest and settle in the bottom of the tank.



End View of Waste-Saturating Apparatus

At one end of the saturating tank stand is an oil filter through which the lubricating oil in the tank is passed every fifteen days. In this way the oil is kept as pure as possible by removing any collection of small fibers and dirt that may be separated from the reclaimed waste.

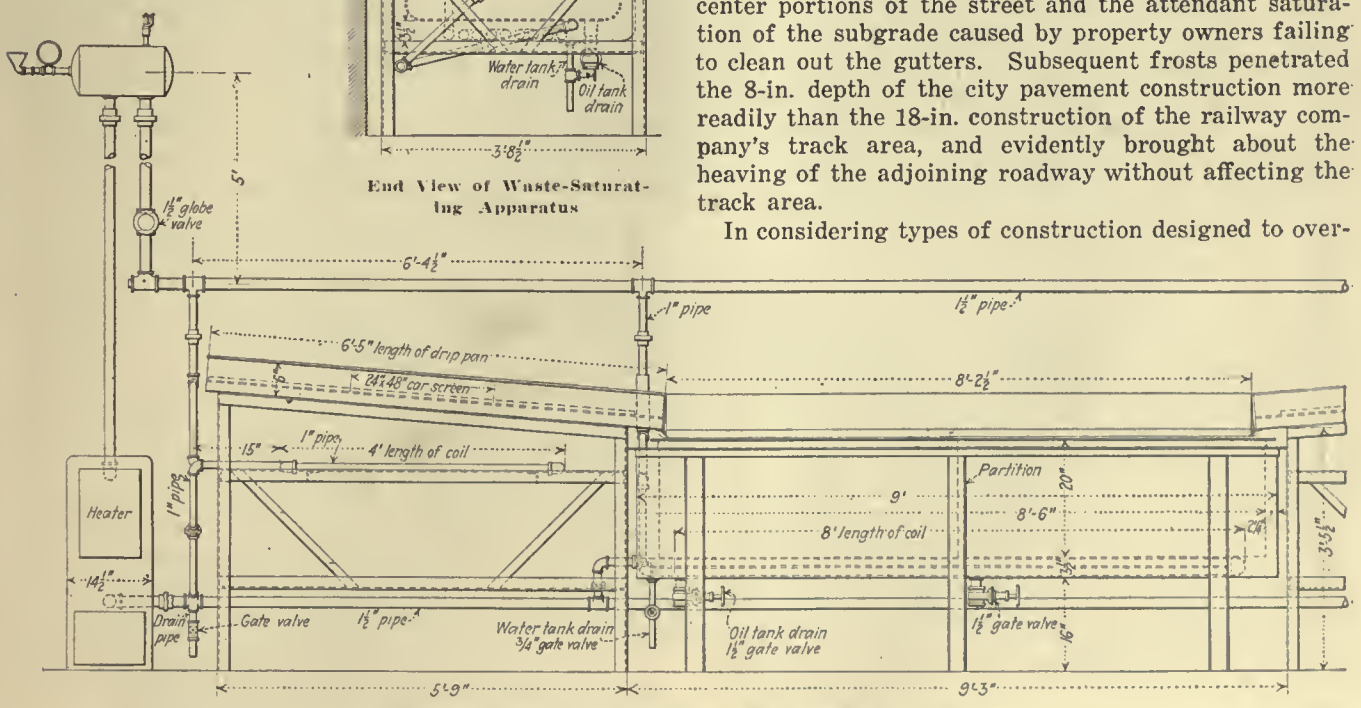
Extreme Heaving of Pavement Adjacent to Track Construction

Checking of Levels on a Stretch of Track in Allentown, Pa., Shows that What Appeared to Be a Settling of the Track Construction Was in Reality a Heaving of the Adjacent Asphalt Paving

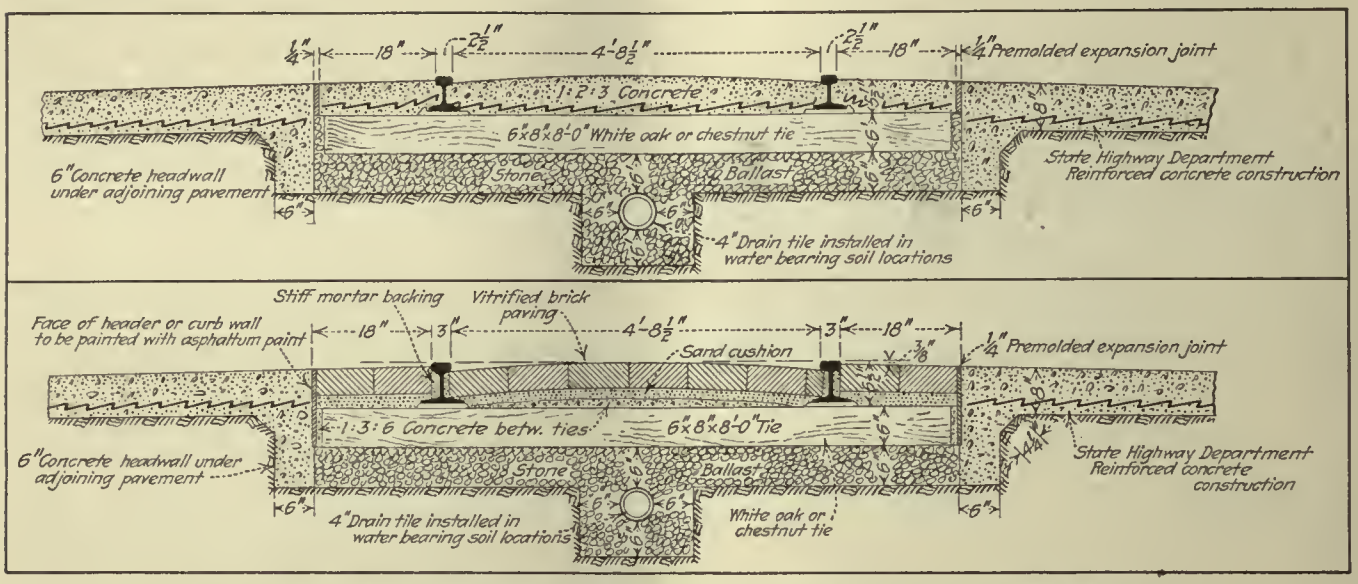
THE accompanying halftone illustrates in a very striking manner the condition of some track construction and the paving adjacent to it on Seventeenth Street, between Hamilton and Turner Streets, in Allentown, Pa. The photograph was taken on March 1. Check levels taken by the city engineers to determine whether the track had settled from the original construction grade showed that there was no appreciable settlement in the top of the rail or the paving in the track area. The paving and track construction was put in last fall and at the time of the investigation was five months old. The asphalt paving was on a concrete foundation, and measurements showed that in some cases the paving in the outside area was from 4 in. to 5 in. higher than when laid last fall. Since the original levels were taken, the engineers of the railway have been following up conditions carefully, and a month after the first levels were taken it was found that the pavement had dropped back from 1½ in. to 1¾ in.

The depth of the city paving construction is 8 in., and that in the track area 18 in. The primary cause of the heaving of the asphalt adjacent to the track construction evidently was due to the flooding of the center portions of the street and the attendant saturation of the subgrade caused by property owners failing to clean out the gutters. Subsequent frosts penetrated the 8-in. depth of the city pavement construction more readily than the 18-in. construction of the railway company's track area, and evidently brought about the heaving of the adjoining roadway without affecting the track area.

In considering types of construction designed to over-



Construction Details of the St. Louis Waste-Saturating Apparatus



At Top, Concrete Paving Construction with 80-Lb. A. S. C. E. T-Rail. At Botton, Construction with Vitrified Brick Paving and 105-Lb. Dudley T-Rail

come such difficulties, a new type of construction advanced by W. R. Harris in the *Highway Engineer & Contractor*, July, 1919, was adopted by the Lehigh Valley Transit Company as the most promising and recommended by it to the various city and borough engineers in the territory served. This type was independently picked up and adopted by the New Jersey State Highway Department while the Lehigh Valley Transit Company was working with the Pennsylvania engineers, with the result that it now has been adopted by the Pennsylvania State Highway Department and assurance given of such a course by the city engineers of Allentown and Bethlehem, Pa., as well as in other localities.

Accompanying illustrations show this construction for standard vitrified brick paving with 105-lb. Dudley T-rail and for concrete paving with 80-lb. A.S.C.E. T-rail. It is evident that if such designs of track construction as illustrated, and others which have been worked out to overcome such conditions by other railways, are adopted, the damage to adjoining pavement in track areas can be decreased materially if not entirely eliminated, and that certain improvements in design of the roadway construction is necessary. In adopting this type of construction, it is evident that the state highway departments of New Jersey and Pennsylvania have come to the conclusion that whatever the type of construction in the track areas, complete and effective isolation therefrom is the first prerequisite for obtaining adequate life of the adjoining roadway pavement, and that such additions or changes to the standard construction as are necessary to accomplish this end are a part of their obligations.

The construction recommended by the Lehigh Valley Transit Company provides a header 18 in. deep along the edge of the track area. A premolded expansion joint is also installed between this inner wall and the track area. With this construction, frost must first penetrate to a depth of 18 in., whereas with no header wall, only an 8-in. penetration of frost is required to start trouble. The premolded type of expansion joint was adopted by the Lehigh Valley Transit Company due to its ease of installation. The use of such an expansion joint not only closes the joint more effectively against leakage of water, but also acts as a desirable shock absorber. A material reduction, if not the entire elimination, of vibration from the adjacent track is thus brought about. The filler used, of course, varies in depth with the type of construction and extends down only as far as the solid portion of the track construction, that is, the paving and its foundation.



Heaving of Asphalt Paving Adjacent to Track Areas Caused This Condition in Allentown, Pa.

The Boston "L" and the "Tech."

The special course in electric railway training, which is being conducted by the Massachusetts Institute of Technology in co-operation with the Boston Elevated Railway, is the subject of an article in the April, 1923, issue of the *Technology Review*. This is the alumni publication of the Institute. This course was outlined in the report of the committee on education of the American Electric Railway Association, presented at the Chicago convention in 1922. Edward Dana, general manager of the Boston Elevated, is chairman of this committee. The co-operative course is modeled on those which have been successfully conducted for years by educational institutions and manufacturing concerns in collaboration. In this case the student, after two years at the Institute, spends alternate periods of three months in the employ of the co-operative company and at his studies.

The Salvage of Worn Steel Car Wheels

The Local Heating to Fusion of a Small Portion of the Metal in Car Wheels While Building Up Worn Flanges or Treads Produces Complex Internal Wheel Stresses and Strains, a Method for Neutralizing Which Is Given

By W. J. Merten

Metallurgical Engineer, Material and Process Engineering Department, Westinghouse Electric & Manufacturing Company

THE reclaiming of worn steel car wheels by arc deposition of metal on treads and flanges presents a problem of considerable economical importance and is a fascinating one for electric railway master mechanics, the welding engineer and the metallurgist. Automatic arc-welding machines employed for this work contribute considerably to the need for exact and correct processes to obtain a wheel that will perform satisfactorily and to permit prediction of successful service with a fair degree of assurance.

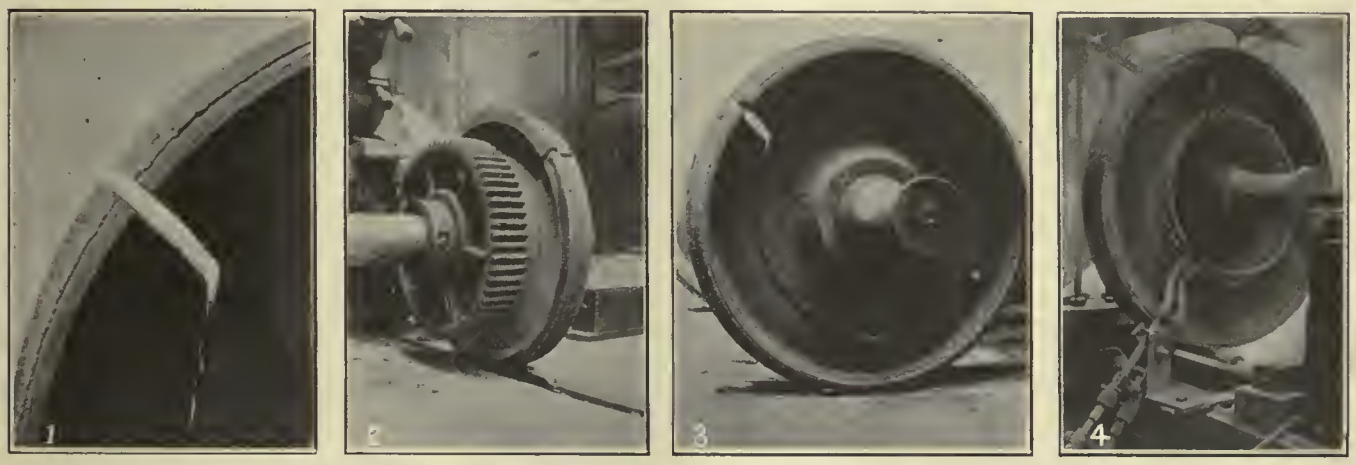
To salvage worn wheels economically they must not be removed from the axle for the building up of the tread and flange. A high temperature anneal or preheat is, therefore, not feasible. Obviously, continuous welding upon a cold wheel subjects the metal to a repetition of expansions and contractions, causing an additional disturbance of the already meta-stable equilibrium of the metal, resulting ultimately in a fracture. It is a well-known fact that the failure of wheels or their spontaneous cracking during welding is frequently caused by residual strains due to manufacturing processes accentuated by disturbances resulting from local heating.

The analysis of such a failure occurring during welding while immersed in cold water, or immediately after finishing the first layer on the tread, indicated a high degree of internal straining and enormous additional external stressing due to shrinkage of the band of arc-deposited metal. The recognition and consideration of the magnitude and distribution of these stresses and strains and their influence upon the successful repairing of wheels is all important.

The existence of residual internal stresses in car wheels, resulting from the respective manufacturing processes, has always been recognized and conceded. However, little is known of their amplitude and distribution. The state or form of these internal strains demands consideration when subjecting the wheel to stresses induced by means other than by loading and service applications. It is evident that any work done upon the wheel producing stresses that are cumulative with the residual stresses must be considered dangerous and compel the application of processes for neutralization of these stresses or for entire elimination of them.

An example of such work is autogenous welding by the electric arc, or by the oxyacetylene gas flame. The local heating to fusion of only a small portion of metal produces a tremendous straining in the adjacent portions or parts, which, in turn, influences the freezing of the arc-deposited metal by causing heavy straining in it, by a rapid abstraction of the heat or rapid cooling from the liquid condition. This welding is especially dangerous since the operation is conducted while the wheels are mounted on the axle, therefore abounding in stresses and strains in the hub and plate caused by the mounting or pressing of the wheel on the axle. These stresses are additive in character with the residual manufacturing stresses.

In building up worn treads and sharp flanges on rolled steel car wheels by arc-deposited metal, this localizing of heat is even more pronounced than in oxyacetylene flame heating where a spreading of the heat is greater because of the required amount of preheating before fusion occurs, and for this reason it is of greater importance to guard against the amplification of the internal stresses and strains when arc deposition of metal is employed for this work than with oxyacetylene flame welding.



Fracture in Car Wheels Due to Stresses Caused by Differential Cooling of the Rim, Plate and Hub and from Rolling Heat During Arc Welding of the Tread

Fig. 1—Fracture at rim. Fig. 2—View of fracture at gear side. Fig. 3—The fracture extends around the web of the wheel. Fig. 4—Method of preheating employed to prevent fracture of wheels during arc welding by neutralizing the stresses.

It is generally held that mounting of the wheel on its axle produces compression in the wheel radially. The intensity or magnitude of these compressive stresses is greatest in the hub and decreases in the plate toward the rim and becomes very small at the tread. Tangentially, tensional stresses are produced by mounting and while they probably decrease appreciably toward the rim, their magnitude must be appreciable, and in conjunction with the tensional stresses and strains caused by differential cooling of rim, plate and hub from the rolling heat they are of sufficient intensity to cause rupture at comparatively small additional straining as is illustrated by the fracture of two 38-in. rolled-steel car wheels during arc welding of tread in Figs. 1, 2 and 3. While structural coarseness of grains may have contributed considerably to this failure, it is probably not far from correct to attribute the cause to internal straining of the steel. The microstructural examination made at the positions as shown in the sketch, Fig. 5, did not show abnormal conditions. Figs. 6, 7 and 8 are photographic reproductions of microstructural characteristics of the parts near the weld and from the fractured portion.

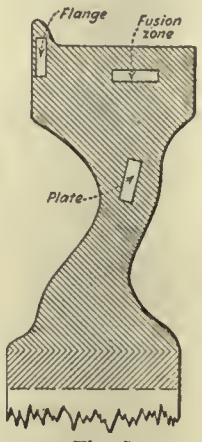


Fig. 5
Location on wheel where microscopic observations were made.

Stresses and Strains Due to Cooling from the Rolling Heat

The cooling of steel wheels from the rolling, pressing, or forging heat involves changes of volumes not occurring at the same time, resulting in elastic strains set up to equalize the disturbed equilibrium. A considerable amount of inelastic straining, however, takes place at the junction of the rim and plate and at the junction of the hub and plate, due to this differential cooling resulting from non-uniformity of cross-sectional dimensions or non-uniformity of mass. It is this inelastic straining, coupled with the strains produced by local heating from a partial fusion of spots or areas that are arc welded, and the differential expansion and subsequent contraction inevitably resulting in heavy stresses, that can be held responsible for most failures such as are shown on the photographs which have been referred to previously.

The success of a welding operation for the salvage of worn wheels obviously depends upon the successful reduction of the internal stresses to a magnitude or value permitting the additional straining without exceeding the elastic or endurance limit of the metal. A favored method to keep stresses down in a wheel that is subjected to welding is to interrupt the continuity of the deposit and let the welded section cool while welding is practiced on a portion diametrically opposite or some distance removed from the preceding one. In this manner a fracture due to an accumulation of stresses is less likely to occur. However, its degree of suppression is uncertain and may not be sufficient to permit the addition of stresses due to loading, track irregularities, curves and brake pressures.

Another still more questionable practice to keep down cumulative straining is the cooling of the wheel during welding by water sprays or by immersion in water except for a small part left exposed for welding. This particular method was employed on wheels shown in Figs. 1, 2 and 3 and clearly illustrates the fallacy of such a procedure.

Fig. 4 illustrates the method employed by the writer to overcome the difficulty. A patent application for this process assigned to the Westinghouse Electric & Manufacturing Company is pending. The principal feature of this process is the selective heating of parts of the wheel prior to, during, and after the deposition of metal by automatic, continuous arc-welding machinery, so as to change the magnitude or physical dimensions of the wheel a desired amount, thereby producing a band or series of bands of arc-deposited metal of linear dimensions or lengths to fit snugly around the periphery of the tread and flange without increasing unduly the stresses in the wheel caused by contraction when cooling. The operation of the process follows:

The wheels mounted on the axle and suspended on the centers of a lathe should have a pair of semicircular burners attached and set at approximately one-fourth the radial distance of the plate or between the hub and rim and close to the concaved side of the plate as shown in the photograph. If heating is done by gas as illustrated, a ½-in. gas pipe drilled with three ⅛-in. holes in a 45-deg. angle around the inner quadrant of the circumference should be used, directing flames against the hub plate and rim of the wheel.

The wheel should be preheated to approximately 250 deg. C. before starting the welding heat. As the first layer of strands is deposited on the tread, the temperature of the wheel toward the end of the deposition of the first layer should be increased to above 350 deg. C. but not exceeding 450 deg. C. The second and third layers should be deposited while keeping the wheel at this heat. The flange can then be built up while gradually reducing the temperature during this period to approximately 200 deg. C. When the deposition of metal is completed, the heat should be turned down to reduce the temperature in the plate to about 150 deg. C. and to dissipate the heat in the rim and the hub to a point where the temperature is approximately 60 deg. C. or where the hand can touch the wheel without danger of being burned. The heat can then be turned off entirely, allowing the plate and wheel to cool to room temperature. The heat application is fairly uniform, of sufficient intensity and is applied for an adequate period of time to reduce internal straining to values that will permit the additional external stressing due to the contraction of the arc-deposited metal on cooling and not exceed the ultimate strength of the material.

The low starting temperature (250 deg. C.) was employed to bring about a gradual release of the internal straining and disturbances which may happen in the throat of the wheel and fillets of the plate and rim and those in the hub due to mounting of the wheel on the axle. The higher heat of 350 deg. C. to 450 deg. C. is sufficiently high to remove completely internal straining and to remove all or any accidental local chilling effect to which the wheel may have been subjected after rolling on cooling from the high rolling heat.

However, the maximum temperature of 450 deg. C. is not sufficient to cause any structural or grain refinement, nor is it high enough to result in coarsening the structure or grain growth. The enhanced physical strength of the steel at these elevated temperatures also contributes to the success of this method of procedure. Obviously the second and third layers of arc-deposited metal are approximately ½ in. longer on this hot 37-in. diameter wheel than when put on a cold

metal, and on cooling they contract to the natural dimensions of the wheel with the rest of the metal, without subjecting the wheel to abnormal and compound stresses.

By lowering the heat in a wheel during the deposition of the first layer and then raising the temperature for the additional metal deposition, the first layer is put under tensional stresses. The effect of these stresses is similar to hot working of this layer, when on deposition of the succeeding layer it is heated to almost a fusion temperature, so that by judicious selection of conditions an appreciable increase in physical strength will result.

A drastic cooling from a very high or superheated liquid heat, such as is encountered in arc-deposition, puts the metal in a turbulent condition and produces a grain structure such as is illustrated in Fig. 10.



The characteristic markings of this microstructure present a twining of metallic crystals, primarily of exceedingly small size and produced by drastic cooling of the liquid metal while in a state of violent motion. The sudden growth of these crystals while subjected to external stresses causes a deformation of the crystals, which produces a fold or gliding and slipping action upon the crystallographic planes.

Such a structure offers a region of metal of low resistance to compressive stresses, to which the tread of the wheel is subjected at the time of its contact with the rail head, causing a formation of a series of small cracks and fissures similar in appearance to shattered zones in railheads. Reheating to an annealing temperature modifies this structure to a more desirable form and will result in more successful and longer service.

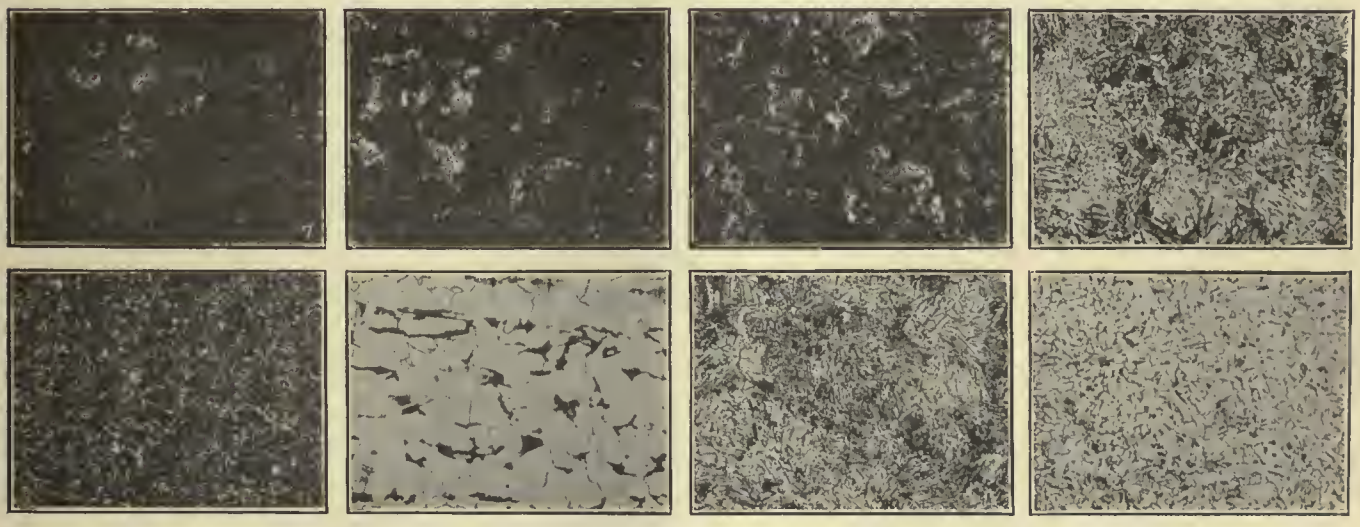
Fig. 11 shows a microstructure of the fusion zone and illustrates clearly the diffusion of the low-carbon electrode metal into the higher carbon wheel metal, the white markings being free ferrite crystals. Fig. 9 is a microphotograph of the original car-wheel metal and is a sorbitic structure of fairly good grain size and fairly high physical strength.

Fig. 12 is a section from a built-up journal of a car axle and exhibits the same structural characteristics of arc deposited metal as described above.

Fig. 13, however, shows very markedly the effect of the welding heat on the modification of the banded condition of the original axle steel. A decided twining has taken place, and a pronounced weakness to resist fatigue-inducing stresses is characteristic of this.

Fig. 14 presents the grain structure of the original shaft and shows the banded condition resulting from rolling the bar, no heat treatment of any kind having been employed to bring about structural refinement and higher strength. Obviously the presence of these three zones of entirely different steels within the cross-section of the axle is very objectionable and unfavorable to the exacting requirement of a car wheel axle, and endurance under continued alternate stresses is very doubtful.

A process to diffuse or broaden the band of this fusion zone in arc-welded axles, to neutralize its weakening effect, and to improve the arc deposited material, has been developed by the Westinghouse Electric & Manufacturing Company. This process consists of heating the welded shaft portion to an annealing heat and quenching it from this temperature. The heat is applied by an electrically heated muffle furnace and is concentrated upon the welded portion. Water cooling keeps the rest of the shaft from materially changing its sorbitic structure. Then, after thoroughly diffusing the band, the heated part of shaft is cooled rapidly by a water spraying system to ordinary room temperature.



Microscopic Views Showing Structural Characteristics of Sections of Wheels Near the Welded and Fractured Portions

Fig. 6—Plate.
Fig. 7—Flange.
Fig. 8—Fusion.
Fig. 9—Microscopic structure of wheel metal before heat was applied.

Fig. 10—Microscopic structure of arc-deposited metal.
Fig. 11—Microscopic structure of fusion zone metal after arc deposition of metal on tread of wheel.

Fig. 12 — Microscopic grain structure of a section taken from a built-up shaft before application of heat. This shows a fairly good grain size and high physical strength.

Fig. 13—Microscopic structure of metal deposited on axle journal by arc welding.
Fig. 14—Microscopic appearance of metal in fusion zone after arc deposition.

Important Factors Influencing Successful Salvage of Wheels

A careful examination of the information presented points out a number of interesting and important factors which influence the successful salvage of car wheels by arc deposition of metal upon the worn parts: (1)

The internal straining of a wheel due to air cooling from a high rolling heat is of a magnitude not infrequently reaching the elastic limit of the material in sections or parts cooling more rapidly due to drastic or abrupt changes in cross-sectional dimensions. (2) Unequal heating as well as unequal cooling of such wheels introduces additional straining, resulting in overstraining and failure of the material. (3) Even a comparatively low temperature preheating operation, followed by a slight raising of this heat during the process of arc deposition of the metal, will neutralize and modify these strains to a degree that assures the success of an economically very important process.

Roller-Bearing Tests in England

The National Physical Laboratory, Teddington, has Carried Out Tests in London and Wigan on Hoffmann Bearings

DURING 1921 and 1922, the Hoffmann Manufacturing Company, Ltd., arranged with the National Physical Laboratory, Teddington, England, for tests on two single-truck cars of the Wigan Corporation Tramways, and one double-truck car of the London County Council. The tests carried out consisted of (1) electric power consumption measurements on service runs, including determination of time and distance; (2) tractive resistance tests along straight tracks; (3) determination of starting effort, and (4) retardation tests. The essential data which were secured are shown in the curves which are reproduced, where, for convenience, the data for the two sets of tests are combined. The results speak for themselves and no comment is necessary. In interpreting these results, however, it will be necessary to know something about the cars, the characteristics of the routes on which the tests were made and the methods employed in the tests.

The Wigan Tests

The cars selected for the tests at Wigan were built by the English Electric Company, Ltd., Portsmouth, and were double-deck cars fitted with Brill type 21-E trucks, with wide-wing axle boxes. Each car weighed 23,500 lb. empty.

The apparatus used in the tests comprised an Elliott recording voltmeter, a recording ammeter, a recording drawbar dynamometer, and a recording distance-measuring device operated by a wheel rolling on the track and supported from the rear buffer beam of the car.

The service tests were made on a 2½-mile route under different conditions of weather and of traffic. The energy consumption varied from 1.16 to 1.82 kw.-hr. per car-mile for the car equipped with roller bearings, and from 1.49 to 2.43 kw.-hr. for that with the plain bearings. The corresponding averages are 1.56 and 2.09 kw.-hr., a saving of 0.53 kw.-hr. or 25.4 per cent in favor of the roller bearings. Comparative pairs of individual tests, made under similar conditions, showed percentages of saving from 22.1 to 30.5.

In the tractive resistance tests the car under test was hauled by the other car through the dynamometer device, and records of pull, time and distance traversed were made. Results were obtained for the car unloaded, and also loaded with 9,000 lb. of sand bags. The percentage in favor of the roller-bearing car is remarkably uniform, averaging about 30 per cent reduction as compared with the other. From calculations of the amounts of energy applied to the trail car through the dynamometer, it appears that the difference in favor of the roller-bearing car is 31 per cent with load and 23 per cent without load, on the average.

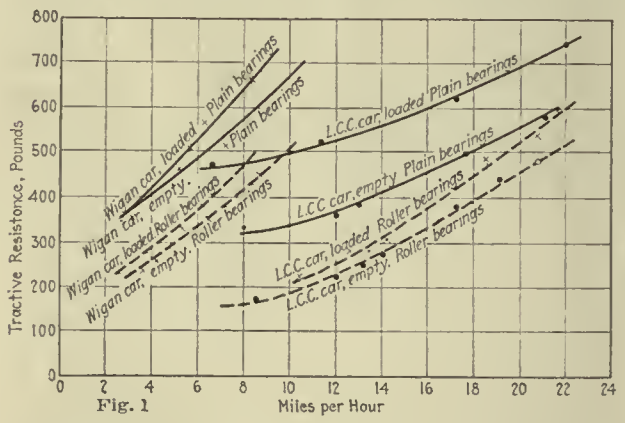


Fig. 1

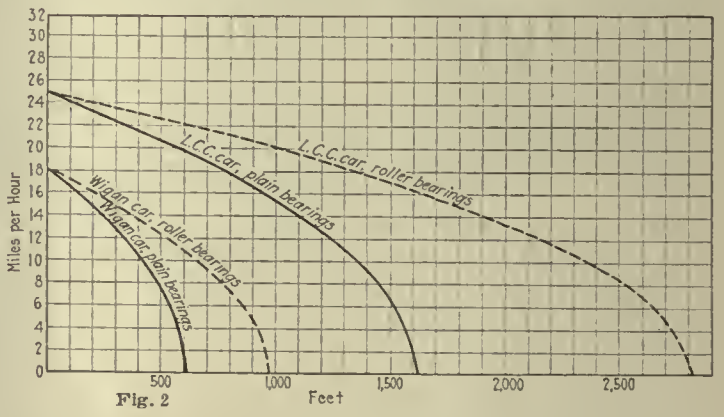


Fig. 2

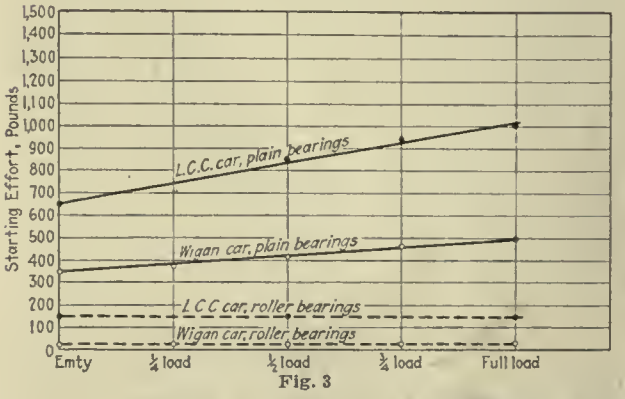


Fig. 3

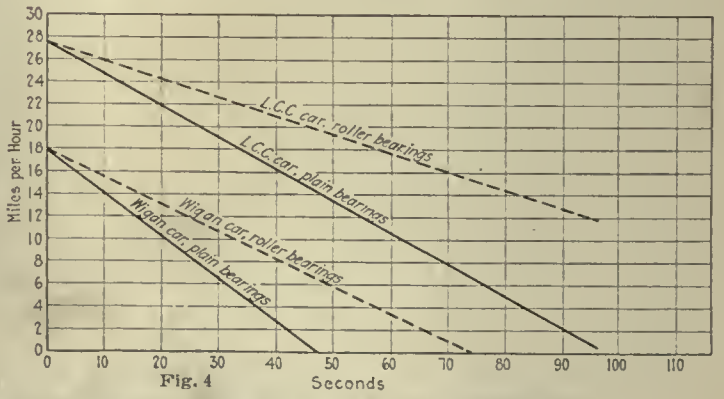


Fig. 4

Results of Tests on Cars Equipped with Plain Bearings and Roller Bearings Respectively

Fig. 1—Tractive resistance at various speeds. Fig. 2—Coasting-distance curves. Fig. 3—Starting effort at different percentages of full load. Fig. 4—Results of coasting-time tests.

In the starting-effort tests the car under test was connected through the dynamometer and a pulley block to another car, which was securely held by its brakes. The tension of the free tackle rope was gradually increased until the car just began to move. Tests were made in each direction with the car empty and loaded with 1, 2, 3 and 4 tons (2,240 lb.) respectively. The roller-bearing car was also permitted to start down a slight gradient and the pull exerted by it was measured. The mean values of the starting friction showed a reduction in favor of the roller-bearing car of more than 94 per cent.

The retardation tests were made on a reasonably straight section of track, and measurements were made of time and distance as the cars slowed down from various speeds. It was found that the retardation increased with the initial speed, which was attributed to the oscillation of the car. While both cars oscillated at high speed, the increase in retardation at the higher speed was less for the roller-bearing car, indicating that the axle bearings employed enabled it to take the end thrust of the axle with less braking effect than occurred in the car fitted with plain bearings.

The average distance run by the roller-bearing car was found to be 57.2 per cent greater than that covered by the other car.

The London County Council Tests

The London County Council car was one of its standard double-deck, roof-covered type, mounted on two swing-bolster trucks. The car was a new one, with a seating capacity for thirty-two persons inside and forty-six outside. The car was constructed to drawings and specifications supplied by the London County Council, the builders being the Brush Electrical Engineering Company, Ltd., and Messrs Hurst, Nelson & Company, Ltd. The electrical equipment and magnetic brakes were supplied by the English Electric Company, Ltd., and the Metropolitan-Vickers Company, Ltd. The weight of the car was 35,500 lb.

Energy measurements were made by means of a Thomson watt-hour meter, and a dynamometer similar to that used in the Wigan tests was employed. The energy-consumption tests were made on a route 15.7 miles long and the same motorman was employed throughout. To load the car fully, sand bags of a total weight of 10,920 lb., corresponding to seventy-eight 140-lb. passengers, were used. In spite of variations in conditions which favored the car fitted with plain bearings, a saving of about 30 per cent with the roller bearings was found from the half-load test, and more than 26 per cent for all of the tests.

As in the other case, tractive effort tests were made at various speeds with the result that the empty car showed a reduction in favor of the roller bearings of from 50 per cent at 8 m.p.h. to 18.8 per cent at 20 m.p.h., while the loaded car showed a reduction of from 58 per cent at 10 m.p.h. to 19 per cent at 22 m.p.h.

Starting-effort tests, made by the same method as that previously described, showed a reduction in starting effort in favor of rolling bearings varying from 77 per cent with the empty car to 85 per cent with the fully-loaded car.

The retardation tests showed a rate of 0.412 ft. per sec. per sec. for the plain bearing car and 0.238 ft. for the roller-bearing car. Coasting-distance tests were also made, the current being cut off at any particular speed up to 26 m.p.h. and the distance being measured up to the point where the speed was reduced to zero. The percentage greater distance run by the roller bearing car was 73.

The Readers' Forum

College Men in the Transportation Department

California Institute of Technology

Pasadena, Calif., April 7, 1923.

To the Editors:

Your editorials in the issues of March 10 and 31 and remarks upon Mr. Trumbull's letter in the March 31 issue, concerning college men in the transportation department of electric railways, were very much appreciated.

I am at present a junior in electrical engineering at the California Institute of Technology and am very much interested in electric railway work of all kinds, especially the transportation division. Up until now I did not think that there was much thought given to placing college men in this department. The experience of myself and others with two large electric railway properties in southern California is that college men are inferior (in any department) to the men who have been with the company a long time, regardless of training or ability. It is indeed gratifying to know that the question is receiving consideration.

As you imply, the engineering graduate is not looking for "a bed of roses" but for a place where hard work and application of his training will insure him a good future. Our greatest fear is of being pushed into a rut and staying there.

I have been a subscriber to the Electric Railway Journal since my freshman year and find it a valuable asset. To my mind, the regular reading of a technical journal places the engineering graduate a year ahead in his profession by keeping him in touch with the latest developments and with the men who are doing the big jobs.

F. Douglas Telluright.

Preventing Theft of Lamps

Bamberger Electric Railroad

Salt Lake City, Utah, April 11, 1923.

To the Editors:

Referring to communication from Blankburgh, signed "Executive," appearing in Electric Railway Journal, page 512, March 24.

We experienced some difficulty until we had the following words, "*Stolen from B. E. R. R.*," etched in a conspicuous place on the bottom of the globe, which has resulted in practically eliminating the loss of lamps by theft.

Julian M. Bamberger,
President and General Manager.

Weight Wrongly Stated

In the article which appeared in the March 31 issue of the Electric Railway Journal, describing the new cars of the Pacific Electric Railway, a statement was made that these cars weigh, completely equipped, but 27,000 lb. This should have read "the body completely equipped weighs but 27,000 lb."

Equipment Maintenance Notes

Ovens for Baking Railway Motor Armatures

A Comparison of Heating by Steam and Electricity Is Given, Together with Construction Found Most Desirable for Satisfactory Results—Some of the Practices Necessary to Secure Best Results

By John S. Dean
Westinghouse Electric & Manufacturing Company

THE practice of dipping railway motor armatures in a good grade of baking varnish and then baking them in an oven has been adopted by a large number of railway operators during the past few years. Their experience has been that this treatment fills up all the cracks and the pores in the insulation and greatly reduces the possibility of insulation breakdowns, which might be caused by moisture or other conducting substances getting into these openings.

Dipping armatures also acts as an effective bond to prevent vibration of any loose coils or laminations on the armature, thus materially increasing its life. Results in service show that armatures thus treated are better able to withstand the severe mechanical and electrical stresses to which they are subjected by present-day severe operating conditions.

Much of the success of this treatment depends upon the proper baking of the armatures after they have been dipped. To facilitate the baking process the following essential points should be considered in connection with the construction and operation of ovens used on railway properties, thus insuring a reliable finished product.

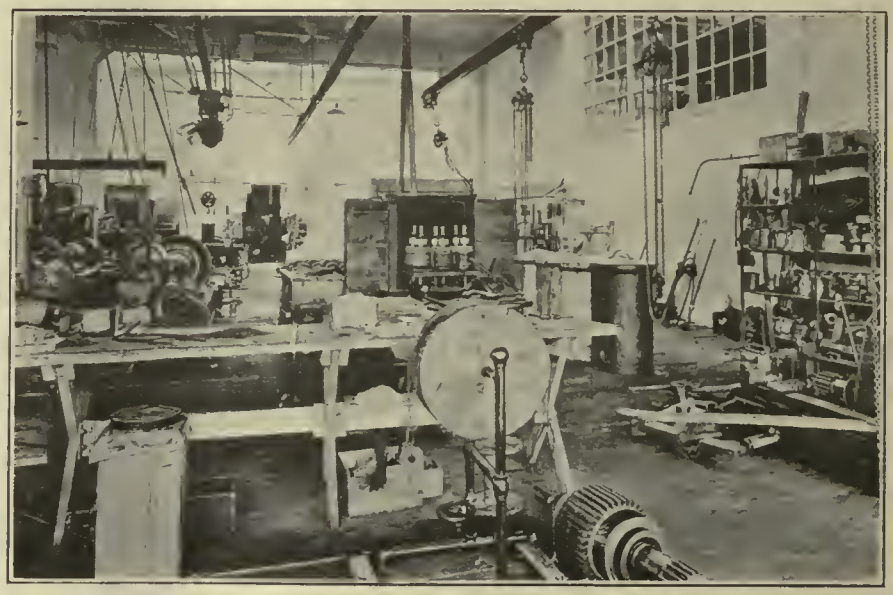
In the design of the ovens there is an advantage in the use of a number of smaller-sized ovens rather than one large oven. By this arrangement one oven can be filled with armatures to be baked without the necessity of being frequently disturbed. This layout is not only more economical but is more flexible, as increased capacity can be obtained by the construction of additional small units.

The four walls and the top and bottom of the oven should be so constructed as to guard against a waste of heat by radiation. Ovens built of sheet steel should be provided with at least 2 in. of high-grade heat-insulating material to reduce the radiation losses to a minimum.

Using a homely illustration, it is a well-known fact that clothes after being washed and hung upon a line will dry more readily on a windy day. This also applies to the baking of the armatures since the vapors from the varnish must be carried away as rapidly as they are formed and fresh air supplied for the proper oxidization of the varnish, so that it will properly set or dry.

This is accomplished by either a system of natural ventilation or by a blower outfit. Either of these systems requires suitable ventilating and recirculating air ducts, both inside and outside of the oven, to give the desired circulation of the air. It is essential to provide some means of measuring and controlling the temperature of the oven in order to secure the best results while the armatures are being baked.

Provision should be made for handling the armatures in charging and discharging the oven. This can be done by means of a large truck moving on a track, or by a number of suitable small trucks on wheels, or by an overhead trolley system. The method best adapted for this work will depend largely upon the arrangement of the inside of the oven for the receiving and storing of the armatures while they are being baked. Convenient doors that can be opened and closed readily should be provided. These doors should be fitted with a quickly operated locking device and should be carefully insulated to minimize the radiation of heat from the oven.



General View of One-Half of a Railway Repair Shop, Showing the Electric Oven for Baking Armatures and the Method of Dipping and Handling Armatures

Steam vs. Electricity for Heating

The heating elements, whether for the use of steam or electricity, should be located in the lower section of the oven near where the fresh air is admitted. Baking ovens used in connection with this treatment are usually heated by either steam or electricity, the method being determined principally by conditions existing on the various railway properties.

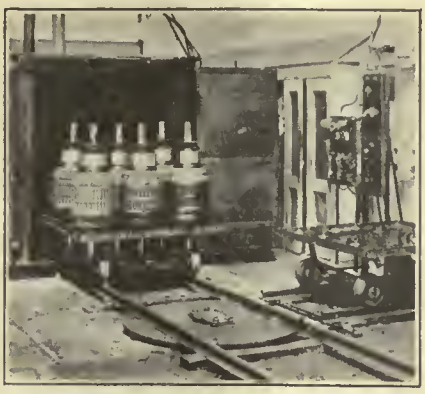
Where a constant supply of steam is available and convenient, the ovens are usually steam-heated, but on the other hand, if there is no steam plant on the property, the baking ovens are usually electrically heated by using old car heaters, grid resistors, or specially designed electric heating elements. Both methods of heating are being used with more or less success, depending to a great extent upon the care and attention given to

this work by the men in charge. Some of the more essential points that should be considered and used as a guide in the selection of the most suitable method of heating are as follows:

To minimize the handling of the armatures, the oven should be convenient to the armature winding room. If steam is used, the available steam supply may not permit this without extensive piping from the boilers to the oven, but there is no such difficulty with electrically heated ovens since all railway shops have convenient electric circuits that can readily be tapped for a supply of current.

In the construction of the oven, the application of steam pipes is more expensive than placing the required number of electric heating elements in the oven. Moreover, the piping from the boiler to the oven should be protected to reduce heat losses, and that is quite expensive. Another point to be considered is that some shops do not have a steam supply available, while a 500-volt trolley line is to be found in all shops as a convenient source of electric current.

Best results in baking armatures are obtained by maintaining the temperature of the oven from 95 to 105 deg. C. If the temperature is too low, the baking will be incomplete and wet armatures will result. If



Electric Armature Baking Oven, Showing Handling Trucks and Control Panel

the oven is kept too hot, the varnish will set non-uniformly throughout the armature, and only surface baking will result, which is undesirable.

Excessive temperatures are also likely to damage the fibrous insulating material and cause it to disintegrate rapidly. Thus a uniform predetermined temperature is essential and this is difficult to obtain when steam heated elements are used since the temperature is controlled manually by the workmen in charge. With the electrically heated oven, automatic regulation can be applied readily and uniform and dependable control of the temperature assured.

In extreme cold weather steam-heated ovens are subjected to low steam pressure with reduced temperature, which is objectionable. They are also affected by a shortage of coal. Electrically heated ovens, however, have a constant source of power from the trolley circuit always available when the cars are running. With steam heating the baking must be done at night only on some properties, as the required temperature of the steam-heated ovens cannot be maintained during the entire twenty-four hours.

It has always been found necessary to equip some steam-heated ovens with auxiliary electrically heated elements to secure the desired oven temperature. With a steam-heated oven, there is a possible danger from defective steam pipes allowing moisture to leak into the oven and do considerable damage to the insulation of the armatures before the trouble is discovered and repaired. In this respect electrically-heated ovens are more reliable and results are more satisfactory.

Since the temperature of a steam-heated oven is controlled by manual operation, an attendant is necessary to make adjustments frequently to insure the desired uniform temperature. Results of operation under these conditions are more or less uncertain, as they depend upon the reliability of the workmen. Ovens that are electrically heated and equipped with automatic control, however, require no attendant and very little supervision.

The actual cost of the steam re-

Now Is the Time to Plant Shop Gardens

The Men Take Pride in Keeping Their Shop Surroundings Attractive, and the Gardens Will Afford Them a Pleasant Means of Recreation

"MORNING, Bill, my daffodils are out." This was the way Jones, the shop foreman, was greeted by "Whistlin' Dick" Singer, the old reliable lathe hand in the Jinxville Electric Railway machine shop, as he punched the time clock at 6:55 one bright April morning. "Looking at the posies around my place this morning suggested to me that we might do something to brighten up the yard around this shop. Let's clean up a lot of that old junk that's piled up everywhere and spade up a few beds. If you'll get the junk away I'll stay any night for an hour or so to help get the thing a-goin'. I'll speak for the other fellows being willing to do the same thing. My son-in-law, Sam Coogan, lives in Brooklyn, and he says the railway there has grass and flower beds around its shop buildings and his friends that work there think it's a good thing. The company fixed up the beds the first time, but the men keep them up."

"Seems a bit fussy to me, Dick," replied the foreman, "it's all right to be dolled up on Sunday, but flowers and shop work don't mix, to my mind. This part of town's no place for it, Dick. How long do you suppose the kids around here would leave a flower or plant in the beds? One day, no?"

"That's one trouble with you, Bill, if you don't mind my saying it," said Dick, "you think anything but grinding out work is 'frills,' but I can't agree with you. Of course, we fellows here in the shop expect to work reasonably hard, but a little recreation as we go along does no harm. Why, I heard the other day about a shop where they put a piano in a spare room and let the men use it out of hours. Several of them could pound out the ragtime, all right."

"Cut it out, Dick" blurted out the foreman, "that soft stuff don't go around here. Flowers, piano — what next? Don't you think a sewin' society might please the young gentlemen who honor this here shop with their presence?"

"No jokin', Bill," said Dick, "our boys are no sissies, but they like the dollin' up that flowers give a place just the same. If you're too tight-fisted to have the yard cleaned up, we'll do it ourselves, if you'll put your 'O. K.' on the proposition."

"Hop to it, Dick; I can't object to getting the yard cleaned up for nothing. But, believe me, you and possibly Ole Olson will be the only ones who'll show up at yard-cleaning time. I'll bet one season will be enough for you, at that."

"You'll swallow them words, Bill; and remember this, you're losing a good chance to get next to the old man, who is mighty fond of a nice yard. What's more, if you feel like having a little exercise, bring your digging fork with you tomorrow morning and join the bunch in a little garden work after the whistle blows. Think it over, Bill."

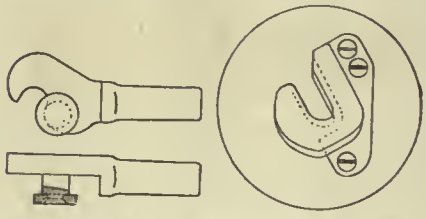
quired to heat an oven may be less than the cost for the electric current, but the consequential expenses are greater. Not only does the steam-heated oven require an attendant, but in some applications steam is obtained from boilers that are used for heating purposes only and which must be kept fired during the warmer weather to supply the necessary steam for the baking ovens.

Generally speaking, current taken from the trolley circuit is usually figured as costing very little for it is produced in such large quantities that the power cost is comparatively low.

Convenient Connector for Cable Between Cars

THE electric railway system of Nuremberg, Germany, uses electric brakes. When operating trailers it is customary to connect the electric brakes of the trailer by means of an insulated double conductor cable to the motor car. Trouble was experienced from these due to the wear of the insulation, the bending of the springs in the contact plugs and the swaying of the cable.

To overcome these troubles, Dipl.-Ing. Schwend, of the company, has introduced a special coupling and uses a 7-mm. steel cable without any insulation for the connection. During the normal braking action the potential difference between the electric brake line and ground is 30 volts. The



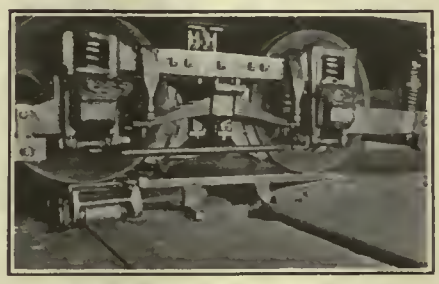
Attachments for Connecting Brake Line Cable Between Cars Used in Germany

cable is brought out from the interior wiring of the car through a metal bushing mounted upon a plate of oil-treated wood. The other end of the cable has a drop-forged special connection of a form and construction similar to that ordinarily used for air brake hose connection. The brake connection between the two cars is made by coupling the two fixtures together. In case of derailment the couplings are pulled apart readily.

Where a single car is used without a trailer the end of the cable is hooked into a blind dummy coupling mounted on a piece of oil-treated wood.

Moving Long Cars on Short Transfer Tables

SOME of the cars of the New York & Harlem Railroad have the distance between the outside wheels of the trucks greater than the length of track on the transfer table. In order to use the transfer table for shifting these cars, an extension as shown in the accompanying photograph is used. There is sufficient clearance at either end of the transfer table



Portable Extension for Transfer Table for Moving Long Cars

so that the cars can be moved with one pair of wheels off the table and still not interfere.

The extension used consists of a bar 2 in. x 2½ in. in section, which rests with one end on the rail of the transfer table while the outside end rests on a roller carriage. This bar is beveled at the end which rests on the track, so that the car wheels can be readily run onto the bar. Two supporting lugs are welded to the bar in the central portion. One of these lugs rests on the extreme end of the transfer table track and the other forms a support midway between this lug and the carriage.

This latter lug does not reach entirely to the track as it would interfere as the transfer table is shifted. In order to form a rigid support while the truck is being run over this a wedge is inserted between the bottom of this lug and the track. The bar has dowel pins at each end, one fitting into a hole in the transfer table track, while the other fits into a corresponding hole of the carriage.

The carriage used consists of a framework with two large rollers. These rollers are 4 in. in diameter and 12 in. long. The outside ends are turned down and a babbitted sleeve is forced over the ends which serve as bearings, so that the rollers will rotate freely. These babbitted ends fit into stirrups fastened to the framework of the carriage. In order to provide for the rolling of the carriage as the transfer table is moved, a plate has been installed on the floor. Of course two carriages and two supporting bars are necessary, one for each rail, and as the transfer table is moved, with the truck in position, the two carriages roll along the iron plate. They cannot get out of position due to the truck holding them firmly.

In moving a car longer than the transfer table, the tracks are lined up and the car is run off the end of the transfer table opposite to that on which the extensions are to be installed. The extensions can then be put in place and the car is then backed up so that the forward wheel rests over the carriage, the other wheel of the truck resting on the end of the bar over the transfer table track. The wedge under the supporting lug of the bar is then removed and the transfer table can be shifted as desired.

Keeping Pit Lamps Dry

IN THE maintenance shops of the Eastern Massachusetts Street Railway at Fall River, the pits are lighted by means of lamps pointed downward in recesses molded in the concrete pit wall. To keep water from draining into the lamp recesses



Water Deflector Over Lamp Recess in Pit Wall

from the track stringer directly above, the deflector shown in the accompanying illustration has been provided. It consists of two strips of wood, 1 in. square, nailed, at an obtuse angle, above the recess.

The recess itself is made with a sloping floor so that it drains toward the pit. The recess is of such form that it tends to reflect light into the pit, and the lamp is placed well toward the front to give a wide angle of dispersion of the light.

Ten-Year-Old Rail Weld

THE illustration shows a section of thermit welded rail which was cut out of the track on Carson Street, Pittsburgh, Pa., where a stretch of old rail had been welded in 1912, ten years previous. The condition of the rail surface at the weld was found



Welded Rail Joint Removed from Track in Pittsburgh After Ten Years Service

to be just as good as elsewhere, although the running surface of the rail was much worn down from the effect of the many years of traffic. If it were not for the collar of the weld on one side of the rail head, the weld at the rail surface could scarcely be distinguished from the rail itself.

An Effective Rail Bender

THE accompanying illustration shows a rail bender designed by M. C. Garlick, supervisor of tracks for the Easton (Pa.) Transit Company, which has proved a great labor saver in bending rails. Rails are bent to any desired radius by passing them between three large cast-steel rollers. Two of these are mounted on the outside end in a stationary position, and the third is fastened to a crosshead on a line midway between the two other rollers.

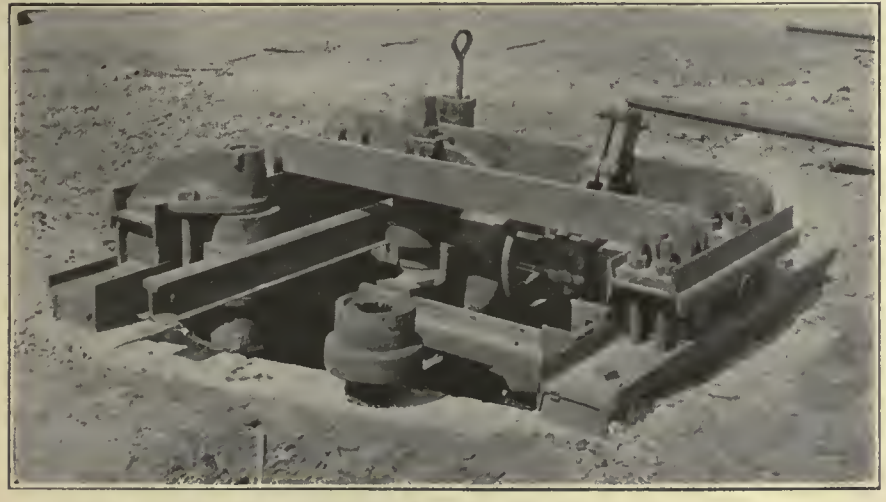
The movable roller can be shifted back and forth by a ratchet mechanism which acts on the crosshead. These rollers are of cast steel, and the circumference is made to conform to the section of rail being bent. Different rollers are used for the various sections of rail. These rollers have bearings of the same design as are standard for the Brill 21-E journal bearings used by the railway, and the central shafts about which they rotate are arranged so that they can be quickly lifted out to change rollers.

The center yoke casting, with its roller, works between two guide rails. In addition to these serving as guides, they also take the side thrust due to the bending of the rail. A large screw at the back end of the yoke provides for its movement. To bend a rail, it is placed in position on the two end rollers and the yoke casting is then moved up against the rail by a hand wheel. To give the pressure necessary for bending the rail, the ratchet mechanism at the back end is used. This ratchet is arranged to receive a long handle in a vertical position, and sufficient pressure can be obtained to bend the rail to any desired radius.

In order that the rail can be bent to the desired radius without passing it through the bender several times, the guide rails are marked for different positions of the yoke castings. These positions are first determined by experiment, but when once established the same rail section can be bent very accurately.

For feeding the rail through the bender, the center roller on the yoke casting is provided with a vertical shaft for receiving long handles. The workmen walk around the bender so as to rotate this roller, and the rail is fed through without difficulty. The company is now considering a motor drive for this so as to do away with the manual operation. In order to bring the crosshead back after the rail has been bent, the dog of the ratchet mechanism works in two directions and can be thrown over for reversing the screw as desired.

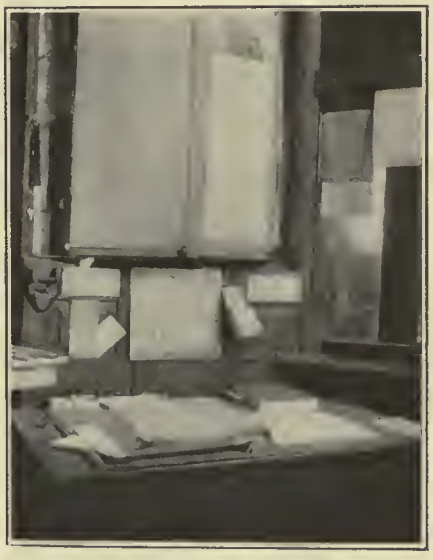
The Easton Transit Company has located this rail bender in the yard where rails are stored and has mounted it permanently on a brick and concrete foundation.



Shop-Constructed Rail Bender

A Revolving Bulletin Board Structure

IN THE shops of the Eastern Massachusetts Street Railway, at Fall River, the master mechanic uses a bulletin board arrangement like that shown in the accompanying illustration. His office is located in one corner of the overhauling shop, and the corner of the office is chamfered off so as to give a width of partition at this point of about 4 ft. His writing table is placed against this partition.



Revolving Bulletin Board Frame Used in Electric Railway Shops at Fall River

In a window in the partition there revolves a six-sided frame carrying six bulletin boards. Material can be placed on these boards in the office and the frame can then be revolved to bring the spaces carrying the posters into plain view in the shop. The master mechanic uses this bulletin board arrangement in connection with a plan for stimulating competition in maintenance work. This involves the use of a number of charts which are mounted permanently on the bulletin board frame.

When a record is to be changed, the frame is simply swung around so that the chart can be modified from the desk, and it is swung back to show the record in the shop.

This arrangement is not only a convenience in mounting the bulletins, but it permits variety in the display of notices and posters. A narrow shelf in front of the frame on the shop side encourages the making of memoranda from the bulletins.

Reboring Holes in Motor Casings

A RADIAL drill has been found by the United Electric Railways, Providence, R. I., to be the best machine for reboring holes in motor casings. There is enough of this work to keep the machine busy, and the operator has developed a high degree of skill in handling this kind of a job. A typical set-up of a motor frame on the bedplate of the machine is illustrated, while a closer view of the jig used on this particular job shows details of its construction.

The jig is made of 4-in. x 4-in. x ½-in. angle iron. It is securely



Radial Drill Set Up for Reboring Bolt Holes for Gear Case in Motor Shell

attached to the motor frame by means of curved pieces, bolted to the vertical side of the angle, which project into the armature and axle-bearing housings. By means of bolts passing upward through the grease boxes, these projecting pieces are firmly drawn against the upper surface of the holes holding the whole jig securely in position and accurately locating it in place. Steel-bushed holes in the horizontal part of the jig guide the drill.



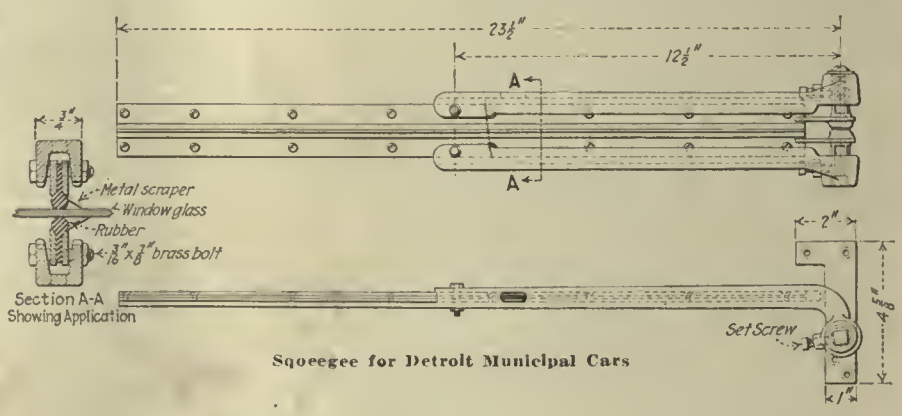
Close-Up View of Drilling Jig Attached to Motor Shell

An interesting feature of this work is that although this drill has been in operation for more than ten years it is practically new in appearance. As shown in one of the illustrations, the motor shell rests on boards and wedges, and this procedure has prevented marring of the bedplate.

Squeegee for Electric Cars

EVERY automobile worthy of the name has a squeegee for clearing the windshield of snow or moisture during stormy weather so that the driver can have a good view ahead, but very few electric cars are so equipped. It may be that because Detroit is the home of automobile manufacture the Detroit Municipal Railway has decided to equip all of its cars with this device. Its construction is shown in the accompanying diagram.

It is operated by hand and cleans both sides of the sash through which the motorman looks to see the road ahead. It consists of a steel arm 12½ in. long, which acts as a handle, a brass rubber holder, a rubber cleaner and a metal scraper, and it is attached to the upper left-hand corner of the window frame by the L-shaped bracket shown herewith. It is expected that the cost of equipping each car with this device will be about $4.50.



Squeegee for Detroit Municipal Cars

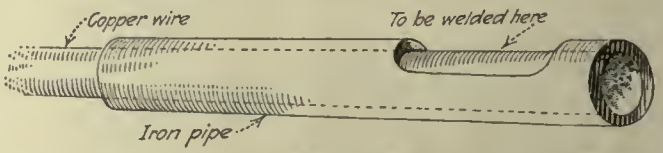
Cross Bonds with Iron Pipe Terminals

BY J. S. WILDER,
Engineer of Maintenance of Way Municipal Railway of St. Petersburg, Fla.

IN CROSS-BONDING our track we use solid copper wire with terminals of heavy black iron pipe. We take 6 in. lengths of this pipe and grind a spot part way through near one end, making the width of the depression same as that of the emery wheel with which grinding is done.

After cutting off a suitable length of solid copper wire for the bonds, we slip one of the pieces of pipe over each end of the wire, completely filling the pipe with the wire. We then hammer the pipe against the wire near where the ground-out spot is located, and weld the pipe and wire together at this spot. For welding we use an oxyacetylene torch and wire, such as are furnished for use in installing gas weld bonds.

We weld these bonds to the base of



Iron Pipe Construction for Terminals of Wire Used in Cross-Bonding

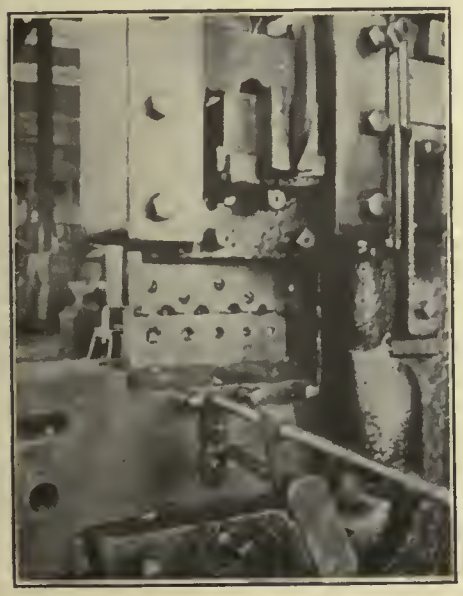
the rail, either by the electric or gas weld process, which can be done without danger of injuring the copper. A wet cloth laid over the copper wire will serve to draw the heat. After the bond is installed, the pipe and weld are given a coat of tar paint to retard rusting. These cross bonds can be made up in advance at odd times at very little expense. Possibly we could get better results if we used cast terminals instead of iron pipe.

Corrections on Blueprints

IN REVISING blueprints the United Railways & Electric Company, Baltimore, Md., uses what are known as "Bourgeois" French water colors, obtained from Eugene Dietzgen Company, New York City. The colors are thinned with water and kept in small bottles, tightly corked. The colors are used like drawing ink. Unfortunately, the colors can be washed off, but as a rule this is not a defect.

Novel Use for Old Punch Press

INCLUDED in the equipment of the blacksmith shop of the United Electric Railways, Providence, R. I., is a combination shear and punch. There was no demand for the punch



Beaudry Combination Shear and Punch Fitted Up with Shears for Cutting Off Round Rods of Several Sizes

part of this machine, so it was changed over to cut off round stock in sizes ½ in., ⅝ in., ¾ in., ⅞ in., and 1 in.

On the bed of the press is mounted a block of machine steel, bored with a row of holes, each fitted with a hardened tool steel bushing to form a die. Each die accommodates loosely one size of rod. This forms the stationary blade of the shear. The moving blade is mounted on the crosshead and consists of a hardened steel plate notched out on its lower edge with notches of size appropriate to the diameter of rod to be sheared off.

By means of this shear a rod can be cut off instantly, with an end which is practically square and without deformation of the cross-section of the rod at the end. This eliminates the objection to shearing off rods in an ordinary shear, or with plain shears in a punch press. The use of the machine largely eliminates the necessity for sawing off rods.

This machine takes very little power when running light. It is kept running a good deal of the time, so that the men can cut off rods with no loss of time.

Lining Up Equalizing Bars

TO FACILITATE the proper lining up of equalizing bars and raising them into position a tool has been devised in the shops of the Metropolitan West Side Elevated Railway which not only performs this task with ease but also with safety. Following two very serious accidents in which the truck man was injured on the foot due to the equalizing bar falling, the foreman in charge of truck work designed the equalizing bar lifting tool illustrated in the accompanying photograph.

The construction is very simple. A 1-in. round wrought-iron bar acts as a lever, while two straps, 1 in. x ¼ in., bent up at the ends form the lifting hooks. The fulcrum is so designed that it can be held in position by a couple of bolt-heads on the truck frame. Holes have been provided in the lifting hooks so that a pin may be inserted after the equalizing bars have been lifted to the desired height. One operator can then insert the spacing casting and spacing bolts into the two equalizing bars. An "X" has been drawn on the inside equalizing bar in the picture so that it may be more easily identified.

Although safety was the real reason for the introduction of this tool, the labor-saving feature of this device should not be overlooked. Previous to its installation three men were required to align and lift the equalizing bars into position. With this new device one man can do the work in less time.



Device for Raising and Lining Up Equalizing Bars

Dipping Compound Kept from Armature Shafts

THE Easton (Pa.) division of the Lehigh Valley Transit Company dips and bakes all of its armatures and field coils, using an effective device designed by C. A. Doud, master mechanic. The dipping tank is located in the armature room, and in order to save floor space the tank is installed underneath an opening in the floor. By means of trapdoors this space can be kept closed when not in use. Armatures are dipped with the commutator end up, and in order to keep the compound off the armature shaft, the slings for supporting armatures are provided with a pipe receptacle at the bottom, which has the lower end closed. In supporting the armature in the sling the shaft rests in this pipe and the shaft is effectively protected, which eliminates cleaning the compound from the shaft as would otherwise be necessary.

The armature shown in the illustration is a Westinghouse type 306, and the sling for handling this type of armature has a 7-in. x 1-in. plate at the bottom, and a 3-in. pipe is welded to this plate as a protection for the armature shaft. This sling is also used for shorter railway armatures, but in this case a longer link is used at the top, which fits farther down on the side guides and thus supports the top of the armature shaft.

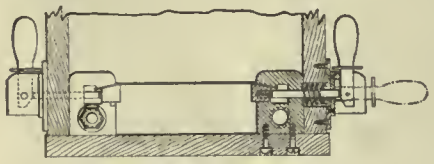


Sling with Pipe Protection Keeps Dipping Compound from Armature Shafts

The sling shown in the illustration on the cover of the door is for handling compressor armatures. An overhead traveling hoist is used for handling the armatures and for lowering them into and raising them from the dipping tank.

Improved Fuse Box Construction

THE accompanying illustration shows an improved type of construction for contact shoe fuse boxes using copper ribbon fuses. This has been worked out by Harvey L. Bullock, general foreman of the North White Plains electric shop of the New York Central Railroad, and has been installed on a number of multiple-unit cars and locomotives of that system. Additional cars are being equipped as rapidly as possible. The improvements consist in the method of operating the wedge for holding the ribbon fuse in position so as to provide for a rapid renewal and also to insure a positive contact at the ends of the ribbon fuse.



Improved Clamping Mechanism Provides for Rapid Renewal of Ribbon Fuses

The terminal block and wedges are of the standard design furnished by manufacturers. Each terminal wedge is provided with a stem which extends outward through an opening in the fuse box. The outer end of the stem has a bearing in a bracket attached to a plate on the outer face of the box. A coil spring surrounds the stem and is set in an opening in the fuse box with one end against the terminal block and the other against a washer on the stem, held in place by a cotter pin. The pressure of this spring thus holds the wedge in its clamping position in the terminal block.

When fuses blow in service, it is necessary that they be replaced as quickly as possible to prevent extended delay. This design provides for quick release of each terminal wedge by a hand lever fulcrumed on a bracket at the end of the fuse box and having the end shaped so as to move the wedge pin.

In its normal position the lever hangs downward and the wedges are held in their clamping position through the pressure of the spring. To release the terminal wedge, the operator swings the lever upward into a position indicated by the dotted line in the illustration. The beveled end of the lever pushes the stem inward with the terminal wedge and thus the ribbon fuse is released. As soon as the fuse has been inserted, the levers are knocked down and the fuse is held firmly in position.

New Equipment Available

Snow Broom Attachment for Truck Mounting

THE Fox Rotary Snow Broom Company, Newark, N. J., has placed a new rotary snow broom attachment for mounting on any standard chassis on the market. The frame is made of standard structural steel shapes and blue annealed steel plates. All parts pertaining to the attachment are mounted on this frame, which can be attached to the chassis by means of U bolts and can be installed or removed quickly.



Rotary Snow Broom Mounted on Standard Chassis

A 70-hp. motor is mounted in the rear of the frame, and power is transmitted from this to the double broom in front by means of a transmission shaft and two high-speed silent chain drives. A set of beveled gears is used in front to change the angle of drive due to the 45 deg. mounting of the broom. The chain drive runs in an oil-tight case and the beveled gears are enclosed and run in oil.

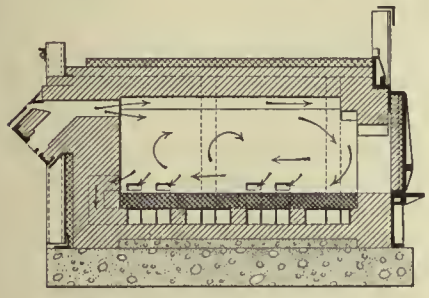
The broom shaft is made of 2¼-in. cold rolled steel and is suspended at both ends and in the center between brooms. Four broom seats are mounted on the shaft, to which the broom halves are clamped. The end and center bearings are of the sleeve type made of bronze. The end bearings are designed for waste and oil lubrication and are suspended by cast-steel arms mounted on heavy pins fastened to the steel frame and concentric with the short transmission shaft between the broom chain drive and the beveled gears. The chain case acts as a suspension for the center bearings.

The arms and chain case are suspended at the broom end by means of a rocker shaft, levers, connecting links and a balanced weight for up and down adjustment of the broom. Should the brooms strike any heavy obstruction they will rise automatically as the balanced weight is free to move up or down as the case demands. The brooms are 34 in. in diameter, spaced 10 in. apart and will clear a road about 9 ft. wide. They are made in halves and are clamped to the broom seats on the shaft. The bristles are of ¾-in. rattan and will give about 100 hours of continuous service.

New Style Furnace Proves Successful

A HEAT-TREATING furnace of a type somewhat different from those in common use has been designed by the Mahr Manufacturing Company, Minneapolis, Minn., and has been giving very satisfactory results, it is said. The more even distribution of heat throughout the interior of the heating chamber, which has been secured in this furnace, makes it particularly well adapted for some kinds of electric railway work. It has been successfully used by the Transit Supply Company in Minneapolis, which is the purchasing organization for the Twin City Railway system, for the tempering of car springs.

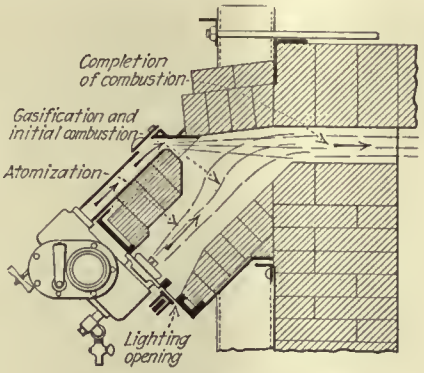
In this furnace the heat is applied directly and evenly to the material. As shown in an accompanying illustration the gases enter at the top of the heating chamber, travel along the roof, down the opposite side, across the bottom, out through apertures at the base of the side walls, and then through passages under the floor. The path of these gases is distinctly different from that in the ordinary furnace where they first strike the under side of the floor, travel along under that, up outside the walls, thence into the heating chamber and up the flue.



Sectional View of New Furnace

The floor and floor supports of the Mahr furnace are not subjected to the destructive action of the direct flame, and replacement of the floor is necessary only when it has been worn out on top by the handling of the stock. The design of the heating chamber insures a uniform distribution of heat from a single burner, thereby reducing the operator's labor to a minimum. A high degree of efficiency in operation is said to be insured by the path of the gases through and under the chamber.

Another novel feature of this furnace is the design of the burner. Either oil or gas can be used with low pressure air at about 8 to 12 ounces per square inch. The air, however, does not enter the burner through a circular opening immediately surrounding the stream of oil, as is usually the case, but is carried through a separate passage to a point slightly beyond, where it mixes with the atomized oil and the combustion takes place. The illustration shows the general design of the burner. This entry of the air by a separate passage permits the quantity to be exactly controlled, and any desired temperature in the heating chamber can easily be maintained.



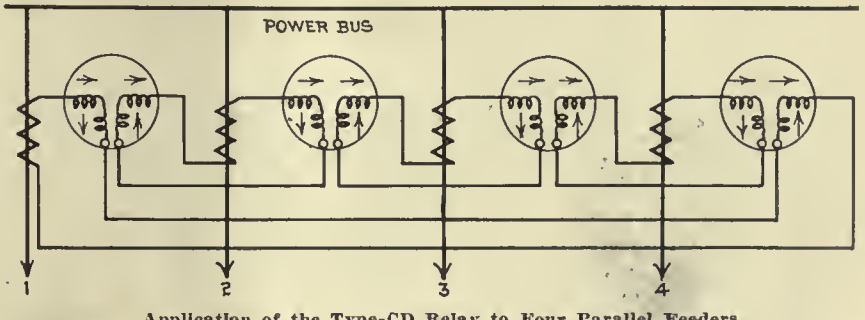
Cross-Section of Mahr Burner

Selective Differential Relay for Parallel-Line Protection

FOR use on two or more transmission lines which are in parallel between generating stations or substations, the Westinghouse Electric & Manufacturing Company has brought out a current relay which gives balanced protection to such lines. This relay, known as type CD, works on the induction principle and operates on current alone. It has two overload elements acting upon a common disk through a common magnetic circuit. Each element is connected separately to its own current transformer in corresponding phases of the two balanced lines. The two elements are electrically opposed, and under conditions of balanced line loads the fluxes in the magnetic circuit of the relay are equal and opposite, giving a resultant zero torque on the relay disk. Under these conditions the disk which carries the moving contact is held in a mid-position by the controlling springs.

Under the proper condition of current unbalance, the disk can rotate 80 deg. in either direction from zero and make contact on either side. Thus the moving contact acts as a single-pole, double-throw switch in the trip circuits of the circuit breakers of the two unbalanced lines, and will trip out the circuit breaker on the line carrying the heavier load.

When one of the lines is open, the differential relay is then automatically converted into an overload relay with a tripping current setting of twice the differential setting, and with the disk tending to rotate in such a direction as to trip out the loaded line.



Application of the Type-CD Relay to Four Parallel Feeders

Time Saved by All-in-One Steel Figure Dies

STEEL figures and letters are used quite extensively in electric railway shops for marking various metal parts. An ingenious arrangement of the steel figures by incorporating them all on one circular piece has just beeen brought out by Marburg Brothers, Inc., New York, N. Y. The figures are cut around one-half of the circumference of a steel disk, the other half being marked so that the blow of stamping can be applied at the most desirable point.

Among the advantages claimed for this arrangement is the saving in time which is usually taken in hunting for the correct figures. The "All-in-One" arrangement is more convenient to handle, and as there is more space for holding there is less danger of smashed fingers. By having the lettering on the side nearest the operator there is no danger of the figures getting upside down, and the individual figures cannot be lost or disarranged.

Steel Plate Roller Bearing Trolley

WITH the objective of producing a strong flexible trolley for severe service conditions, the Yale & Towne Manufacturing Company, Stamford, Conn., has just brought out the "Yale" steel plate trolley. The accompanying illustrations show the details of construction.

The wheels are mounted on roller bearings attached to the side plates, which in turn are connected by a single equalizing pin which supports the shackle plate. Spreader castings are riveted to each plate, and these give a very large bearing surface for the equalizing pins. They are also shaped so as to protect the trolley and act as a bumper which engages the track stop on the lower flange at the end of the I-beam track. The strength of this construction is such that a full load may be safely carried on either plate.

In order to provide an exceptionally strong construction for withstanding shocks and strains, a reserve of seven times the rated capacity is provided. A 1-ton trolley will run on a minimum 21-in. radius curve, extreme flexibility thus being assured. Roller bearings are heat treated, hardened and ground. The grease chamber is so designed as to prevent dust from reaching the bearings.

The axles are set parallel to the I-beam flange. These are pressed into the wheel hubs and supported by the inner bearing plate, so that they are subjected to practically no bending strain. The wheels have chilled-iron treads which conform to the shape of the I-beam flange. The equalizing pin is of cold-rolled steel. It supports either the shackle, eye or clevis, and for use at locations where headroom is limited the chain block can be hooked directly over the equalizing pin.

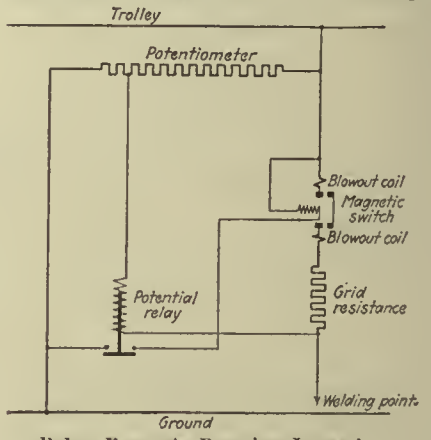
New D.C. Welder Breaks Arc Automatically

THE chief feature of a new d.c. welding apparatus recently put on the market is the use of a potentiometer, a relay and a magnetic switch to break the arc automatically at a fixed maximum length. Moreover, this device is so designed that the full 550 volts are carried by the apparatus only when it is actually in use.

The potentiometer is placed directly from trolley to ground. At a point 50 volts from the end of the potentiometer a tap goes to the potential relay, the other side of which is connected to the welding point. The relay is set to pick up at 50 volts and to drop at 25 volts. When the welding electrode is touched to the ground, therefore, a 50-volt current passes through the relay and it immediately picks up. This action of the relay closes a single-pole double-break magnetic switch which energizes the main welding circuit.

When the electrode is pulled away from the ground there is a voltage drop which at once affects the relay circuit. As soon as the voltage of this circuit falls below 25 volts, which occurs when the arc exceeds $\frac{3}{32}$ in. in length, the relay drops out, thereby releasing the magnetic switch and opening the main circuit.

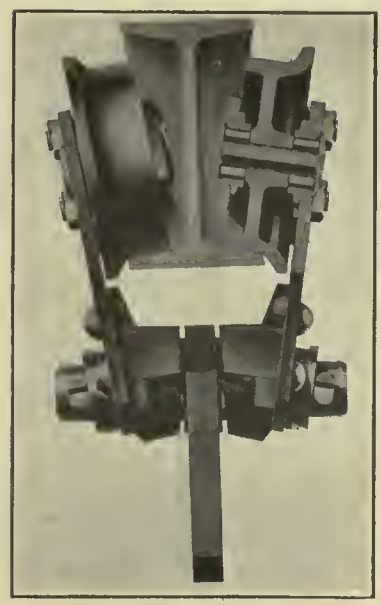
Two advantages that are particularly important in such work as track welding are claimed for this apparatus. In the first place the automatic breaking of the arc at a maximum length of a fraction of an inch eliminates the long flash which strains the eyes of the operator and often burns a hole in the work. In the second place increased safety results from the fact that all of the apparatus between the magnetic switch and the ground is dead except

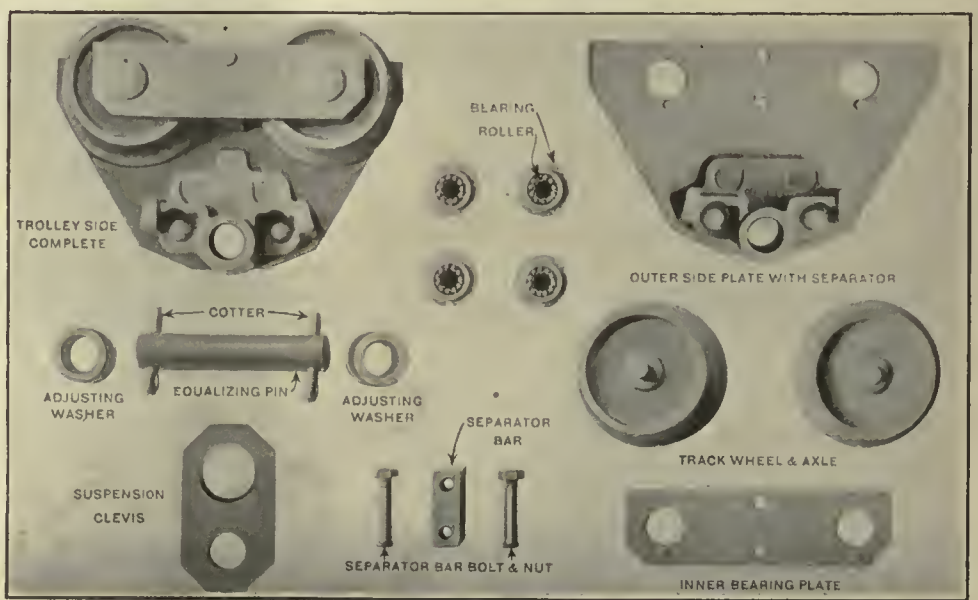


Relay Prevents Drawing Long Arc

when welding is actually in progress. The resistance grids and other parts which a person might carelessly brush against carry full voltage only when the magnetic switch is closed.

The machine is made by the Electric Arc Cutting & Welding Company, located at Newark, N. J., is constructed under its own patent and is compact in construction and light in weight. The relay and magnetic switch are fastened on a piece of slate 15x18 in., and the potentiometer is placed in back. The whole apparatus stands 21 in. high and weighs 70 lb.





At Left, Sectional View Showing Installation of Trolley on I-Beam. At Right, Details of Plain Steel Plate Trolleys

Association News & Discussions

Questions for Consideration of Chamber of Commerce

A NUMBER of questions have been forwarded to the Chamber of Commerce of the United States for consideration at the forthcoming eleventh annual meeting to be held in New York City, May 7 to 11. Among them are resolutions of the American Electric Railway Association and the American Gas Association regarding tax exemption of securities. The former submits the following:

Whereas our present policy of federal taxation has undergone a radical change from indirect to a system of direct taxation which relies chiefly upon levying a high rate of income tax upon those of large incomes, thereby causing a constantly increasing volume of capital to be diverted into the non-taxable securities of the federal, state and minor subdivisions of government, and

Whereas this diversion of capital has proved a serious handicap to productive enterprise by reason of the fact that, while exempting large incomes from the payment of taxes they would otherwise be obliged to pay, and placing an unfair burden of taxation upon those who cannot benefit by such exemption, it gives an unfair competitive advantage in the money markets to the exempted securities, and

Whereas the earnings of electric railways are limited by public regulation and consequently have been and still are insufficient to attract necessary new capital in competition with tax-exempt securities so that they are now being forced to furnish inadequate and unsatisfactory service, which situation will undoubtedly grow worse rather than better if present tax conditions continue, and

Whereas this situation can be corrected and the public properly served only by removing the competition from tax-exempt securities or by making further and in many cases material increases in the rates charged by such utilities for their services; now, therefore, be it

Resolved, By the American Electric Railway Association that it recommends that necessary corrective legislation be provided to remove the present inequitable burden of taxation and to make all income from whatever source and in whatever form bear its just proportion of the cost of government and remove the discrimination now prevailing between securities of the federal, state and minor subdivisions of government and those of private enterprise.

The American Gas Association also submits a resolution supporting the present method of utility regulation by state bodies, as follows:

Whereas the commercial and industrial life of the nation unquestionably depends largely upon efficient, adequate service by the public utility companies supplying light, heat, power, transportation and telephone service, and

Whereas the investment in these enterprises now aggregates more than fifteen billion dollars, and represents the savings of more than a million investors throughout the nation, thus reflecting their confidence in the system of just and impartial state regulation, and

Whereas the welfare of our industries also depends upon the ability of the utilities to attract continuously new capital at reasonable rates to supply the ever-increasing demands for additional service and extended facilities, these companies, in turn, being dependent upon the rates and charges for service which are determined and fixed by order of state commissions, and

Whereas municipal legislators, boards of aldermen, or officials created and designated by them and responsible to them, under the influence of local conditions or political interests, cannot be impartial, disinterested or qualified arbiters of intricate questions of rates, and

Whereas such bodies cannot maintain the necessary trained personnel required properly to advise tribunals in the exercise of quasi-judicial powers over important public services and vast investments, involving large technical and financial as well as business problems; now, therefore, be it

Resolved, That the Chamber of Commerce of the United States of America affirm its confidence in the principles of state regulation of public utilities and takes the position that any proposal to undermine or destroy such regulation, by delegating the state's regulatory powers to boards of aldermen, common councils, or other municipal bodies in the cities, represents a reactionary and retrogressive step, radically opposed to the best interests of the public.

Design of Passenger Stations for Electrified Railways

A LECTURE on the modernization of passenger railway stations, for graduates and students, was delivered before the Institute of Transport in London on Feb. 20. The authors were F. Bushrod and J. F. S. Tyler. As a part of their subject they discussed the influence of electrification of steam lines on passenger station design and operation. Among the points which they made were the following:

Conversion of lines from steam to electric traction, followed by the introduction of a rapid service at regular and frequent intervals, in substitution for comparatively slow and infrequent steam trains, involves consideration of station design from a new aspect. With the growth of passenger traffic, particularly in suburban areas, there came about a gradual lengthening of platforms to accommodate long steam trains. Under electric traction, with shorter and more numerous trains, these long platforms are unsuitable. Even with carefully placed and easily understood stopping marks, passengers have a tendency to spread themselves along the whole length of the platform during the intervals between trains. Time is thus lost waiting for passengers to make their way to the point where the train stops.

The location of platform entrances and their protection require closer attention than was given under the more leisurely steam working. The placing of entrances at extreme ends of platforms brings about uneven loading of trains, which is very noticeable when there are two or three consecutive stations having the entrance at the same end. The best position for the opening onto the platform is a point about the middle of its length.

Owing to the risk involved in passengers attempting to enter rapidly accelerating electric trains, it is essential that entrances should be protected by easily closed barriers, placed as near the platform as possible.

The introduction of an electric train service, with trains every few minutes, obviates the necessity for providing such ample waiting room accommodation as was formerly the custom. Platform covering should, however, be ample, otherwise there is a tendency for the passengers, on a wet day, to congregate under the shelter afforded, and all will attempt to crush into one or two coaches.

The timing of electric trains permits of only brief stoppages at stations, and it is therefore essential that everything possible be done to expedite passenger transfer and handling of baggage. Careful attention is needed to the following details of station design:

1. Ample platform width free from columns, lamp posts and similar obstructions.

2. Platforms of footboard height and having good surface for movements of trucks, etc.

3. Provision of separate entrances and exits at stations where traffic is heavy.

4. Provision of adequate ticket office facilities.

5. Clear and distinct platform and train indicators, direction boards, station name boards, etc.

6. Adequate lighting of platforms and illumination of station name boards.

Where power is taken from conductor rails, the latter must be cut at points where timber crossings are provided for the passage of baggage trucks, etc.

Such crossings are a source of risk where there is a frequent and rapidly accelerating train service, and station design should provide for their elimination, so that, wherever possible, traffic to or from one platform to another can be dealt with without obliging passengers and employees to cross the rails on the level.

Program for the Chamber of Commerce Meeting

ANNOUNCEMENT has been made of the topics which are to be considered at the Chamber of Commerce meeting, under the general headings "Transportation in All of Its Phases in the United States," and "Europe and Europe's Affairs." The list includes (1) communications, (2) distribution, (3) finance, (4) foreign commerce, (5) industrial problems, (6) immigration, (7) insurance, (8) International Chamber of Commerce, (9) merchant marine, (10) natural resources, (11) railroads and (12) transportation.

Transportation includes (1) the farmer's interest in transportation, (2) governmental relations to transportation, (3) readjustment of relative freight-rate schedules, (4) developing a national system of rail, water and highway transportation, involving co-ordination of our transportation systems, co-ordination of railroads, waterways and highways, and co-operation

between the motor and the railroad.

On Friday, May 11, national councillors, delegates and substitutes, officers, directors and members of the Chamber of Commerce of the United States and their families will be the guests of the New York general reception committee, A. C. Bedford, chairman, and of the ladies' entertainment committee of New York, Mrs. William Fellowes Morgan, chairman, on a visit to West Point via the steamer *Washington Irving*. At West Point a special program of drills and exercises by over 1,300 cadets has been arranged by Brigadier General Frederick W. Sladen, superintendent United States Military Academy, especially for the occasion under authority of the Secretary of War.

Southwestern Association

THE program committee of the Southwestern Public Service Association (formerly the Southwestern Electrical & Gas Association), which will hold its annual convention in Fort Worth, Texas, May 15 to 17, has prepared the following tentative program for the meeting:

Tuesday, May 15—General session with addresses by the following: Col. Oscar H. Fogg, American Gas Association, on a subject connected with the gas industry; Hon. Carl D. Jackson, National Electric Light Association, on a subject connected with utility operations; Hartwell Jalonick, on the organization of a committee for business development.

Wednesday afternoon, May 16—A Public Relations session addressed by: Labert St. Clair, American Electric Railway Association, on "Advertising Utility Service"; H. C. Abell, National Electric Light Association, on "Public Utility Information Bureaus"; Luke C. Bradley, district manager Stone & Webster, on "Selling Utility Services Through the Employees"; George McQuaid, director Texas Public Service Information Bureau, on the work of the bureau.

Wednesday morning and Thursday morning, May 16 and 17—Papers and discussions in the street and interurban railway, gas and electric light and power sections.

Summer Convention of A. I. E. E.

SWAMPSCOTT, MASS., will this year be the scene of the annual summer convention of the American Institute of Electrical Engineers, to be held June 25 to 29. The headquarters will be at the New Ocean House.

The keynote of the convention will be advances in equipment and plant design. Among the subjects to be covered will be modern developments in rectifiers; researches conducted upon the nature of insulation failures; artificial transmission lines; electric plant for commercial radio; transmission and distribution; a new type of lightning arrester; lamp quality; street lighting; and a whole session upon the important subject of station economics as affected by the proposed use of 1,000-lb. steam pressure at the New Weymouth station of the Edison Electric Illuminating Company of Boston, and by new methods of conducting away heat losses in generating machinery.

Electric welding will be considered, and other papers promised, which may be included in the schedule, bear upon heat balance and plant economy, duplication of electrical equipment, instrument specifications, and electrical instruments. There will be at least one paper on engineering education.

In the main the afternoons will be devoted to the social and recreational sides of the convention. Provision will be made for inspection trips to plants in the Boston district on each day.

American Association News

Power Generation

THE Engineering Association committee on power generation met in Chicago on April 10. The following members were present: C. A. Greenidge, chairman; W. E. Bryan, F. C. Hanker, G. H. Kelsay, E. H. Scofield, sponsor, and R. L. Weber.

Regarding automatic substations, Mr. Bryan stated that a questionnaire should be sent out to the operating companies with a view to reaching standards for automatic substations. He explained the means of ventilation of some new substation buildings which are being installed in St. Louis. Forced ventilation is used, the air entering through a duct directly underneath the rotor, hence through the transformers and the grids, finally leaving the building through the roof ventilator. Ventilation, he suggested, could be controlled either thermostatically or by means of a time-clock control.

Mr. Scofield suggested the following classification of subjects to be studied or investigated in a questionnaire: Multiple or single feeders from bus; extent to which automatic control is applied; character of supervision; ventilation, forced or natural; power supply, either individual or common; buildings, with or without basement. Discussion brought out, as the order of importance in the design of a substation, the following elements: (1) Selection of the equipment, including the necessary alternating and direct current accessories; (2) decision as to system to be used and provision of adequate space for it; (3) design of the building.

In connection with the subject of reporting failures Mr. Bryan stated that on his property the interruptions to service are listed under two headings: (1) fixing the cause of the trouble; (2) seriousness of the interruption as measured by the load affected.

As to recent progress in power generation, the committee concluded that, inasmuch as the N. E. L. A. and the mechanical and electrical as well as the Edison associations are studying this subject, the committee should make only a general statement of the most recent developments and the latest designs. Mr. Greenidge has secured information as to condensers from various manufacturers and material regarding the best superheater practice.

The next discussion was on the definition of the output of a generating plant. A definition will be submitted for approval, through the proper channels.

H. A. Kidder was delegated to investigate the changes in the specifications for boiler tubes as made by the A.S.T.M. so as to harmonize the association's specifications with them.

For the information of the committee the report of a sectional committee of the A.E.S.C. on terminal markings was submitted as was also that of the electrical apparatus committee of the N.E.L.A. on transformer standards.

Copies of the latter will be sent to all members of the committee, who will be asked to report regarding it.

It was suggested that copies of the N.E.L.A. prime movers committee report should be sent to all members of the Engineering Association.

The meeting adjourned, to meet in June in Cleveland.

Buildings and Structures

PROGRESS reports were made by the four sub-committees of the Engineering Association committee on buildings and structures at the meeting held in Louisville, Ky., on April 16. Besides the chairman, N. E. Drexler, Hampton, Va., there were present the following: B. R. Brown, James Link, J. R. McKay and S. J. Steiner.

The topics taken up and the way in which they were handled are epitomized below:

Electric railway terminals. Plans of a number of passenger, freight and combination terminals were gone over and discussed. On account of the wide scope of this subject it was decided to treat it in a general way and include plans and descriptions of a number of existing terminals, which in the judgment of the committee are well laid out.

Waiting stations. Mr. McKay submitted plans of a number of waiting stations now in use in various parts of the country. This report was approved as containing good data for the final report.

Small bridges, trestles and culverts. After general discussion it was decided to obtain further information on trestles and concrete culvert pipe and to revise the drawings in last year's report.

Revision of existing standards. The chairman presented proposed revisions of Sections Bm-1c and Bm-2c of the Manual. These will be checked and included in final report.

The News of the Industry

Transit Commission Reports

Detroit Body Says Comprehensive System Can Be Provided There Only Under City Ownership

Municipal ownership of Detroit's proposed rapid transit system is the only means of providing a comprehensive passenger distribution system there. This is the opinion set forth in a report by the Rapid Transit Commission, appointed by former Mayor James Couzens to study Detroit's needs. The commission is composed of Col. Sidney D. Waldon, chairman; Col. H. W. Alden; Andrew H. Green; Clarence W. Hubbell, former city engineer and Willard Pope, civil engineer. Daniel L. Turner, New York, is consulting engineer and Major T. J. Hallihan, New York, is advisory engineer.

In the designing of a complete city-owned system, the importance of city planning and regulation by zoning of the heights and uses of buildings must be considered, according to the report submitted by the commission's chairman. The recommendation that Detroit proceed to lay out a large system of streets and avenues is taken as evidence that the survey which the commission is making is not confined to the study of subway and elevated lines.

AIMS TO RELIEVE TRAFFIC CONGESTION

The commission's studies include plans for transportation by private vehicles, buses, surface cars, and rapid transit trains to all sections of the city. The undertaking was to draw plans for a comprehensive rapid transit system capable of meeting the requirements of a population spread over what is referred to as Detroit's metropolitan area. The task as the commission sees it is to facilitate collection and distribution of the bulk of the car-riding public in and between the residential, industrial and business districts with the greatest saving of time and the maximum of convenience to patrons. The system must be the backbone of Detroit's transportation on rails. It must anticipate industrial and business developments and facilitate uniform growth. Above all it is to relieve traffic congestion.

It is pointed out that concentration of population, induced by transportation induces other transportation to tap the same profitable field, and in turn adds to the concentration. All forms of transit when operated wholly for profit, according to the report, act upon this general principle and private ownership of public transportation will always tend toward concentration of population.

The commission's engineers find that the creation of many more centers of concentration will be necessary. Three million inhabitants mean filling all of the vacant spaces in the present city of Detroit and much space that is outside the city. It is recommended that Detroit at once lay plans for mass transportation by rail and automobile. The city is considered as standing at a critical stage in its development.

The engineers state that Detroit is substantially a two and one-half story city spread out over many miles, but it is believed that wide arteries of traffic can still be laid out through relatively inexpensive property, and these can be gradually developed to the plans at a minimum of expense to the city.

It is expected that the comprehensive plan which the commission is developing for Detroit and the metropolitan area will be ready to submit to the voters at the election in November.

Strike Ends—Memphis Men Get Four Cents Increase

The car strike of the employees of the Memphis (Tenn.) Street Railway terminated on April 18 after one day's duration. The walkout was the result of a wage dispute, the men demanding a flat increase of 7 cents an hour. The scale had been 38 cents an hour for the first year, 43 cents for the second and 48 cents for the third. Following a series of conferences the men returned to work on a scale of 42 cents, 47 cents and 52 cents, according to length of service. This represented an increase of 4 cents an hour. No disorder accompanied service suspension.

Complains of Tariff Discrimination

The Salt Lake & Utah Railroad has filed compaint with the Interestate Commerce Commission, asking that the line be made a party to a tariff under which coal from Utah Railway points is shipped to Nevada and California. The complaint alleges that the Utah Railway, which terminates at Provo, refused to grant the Salt Lake & Utah Railroad (Orem Line) permission to enter into the haul of coal from mines in the Castlegate district. Charge is made of an agreement between the Denver & Rio Grande Western and Los Angeles & Salt Lake Railroad by which these companies are to haul the coal to Salt Lake and Ogden for routing to Nevada and California points.

The Orem line asks for equal chance at a routing with the Utah Railway and proposes the routing from the coal fields be the Utah Railway to Provo; Salt Lake & Utah Railroad to Salt Lake; Bamberger Electric to Ogden, and Southern Pacific to points west.

Commission Attacked

Governor Donahey of Ohio Wants Commission to Act in the Interests of People—Resignations Asked

Governor A. Victor Donahey of Ohio, in his pre-election campaign, assured Ohio voters that he would "make the Ohio Public Utilities Commission function in the interests of the people and be fair to both the people and the utilities, or else abolish the commission."

In his first step in this direction, Governor Donahey has demanded the resignation of George T. Poor and Frank B. Maullar, two of the members of the commission. The terms of office of these men do not expire until after Mr. Donahey's term of office is over.

The third member of the commission, whose term has already expired, is C. C. Marshall, who is of the same political faith as the Governor, but Mr. Donahey has already named a new man, Walter Hopkins, Cincinnati, as Mr. Marshall's successor. So far, however, the State Senate of Ohio has refused the necessary confirmation to permit Mr. Hopkins to qualify.

It is reported that if Mr. Poor and Mr. Maullar refuse the Governor's demand to resign he will attempt to oust them.

In a recent message to the General Assembly of Ohio, Governor Donahey said in part:

In my opinion there has been something radically wrong with the manner in which the Public Utilities Commission of Ohio has functioned for several years. Whether the fault lies in the law, the method of administration, the policies of the commission, or its personnel, evils incident to the foreign ownership and control of some of our utilities, or whether the difficulty is a combination of all these factors, I do not profess to know. I am convinced, however, that a crisis with reference to this question of public utility regulation is at hand which can only be solved by unselfish effort upon the part of all concerned to remedy such defects as may exist in the present law or its administration in order that these great facilities may be further expanded more efficiently to meet the needs of our people and at the same time assure the vast number of customers efficient service at reasonable rates.

The records show a vast number of important cases decided without the issuance by the commission of any opinion reviewing the facts involved and stating the reasons for the decision. Surely in cases of this kind the patrons concerned and the general public are entitled to opinions giving reasons actuating the particular decisions and reviews of the facts upon which the decisions are based.

I recommend that it be made mandatory upon the Public Utilities Commission of Ohio in all contested cases to issue in such cases opinions setting forth the reasons prompting the decisions arrived at and a review from the record of the facts upon which such decisions are based.

In my opinion it would greatly clarify the situation if, in all cases where such action is feasible, hearings be held in the community in which the cause of action arises.

Another phase of regulation which is daily growing of more concern to our people is the matter of valuation for rate-making purposes. I am convinced that for a number of years the staff of engineers and accountants in the employ of the commission has been woefully incompetent and inadequate properly to do justice to the pub-

lic's interest. It is my hope that this staff may be so reformed as to inspire a feeling of confidence in our people that in all valuation matters the state is using the best engineering and accounting talent available to insure a square deal—nothing more and nothing less—to both the public served and the utility rendering service.

If further appropriations are found necessary to accomplish these ends they should be freely granted. As it has been administered in recent years, the regulation of Ohio public utilities has paralyzed municipal control and reduced many of our cities to a condition of helpless rage or deadly indifference.

Birmingham Jim Crow Law Enforcement Postponed

Enforcement of the recently adopted Jim Crow ordinance to require separate cars or compartments with separate entrances for white and negro passengers has been postponed for thirty days by the City Commission of Birmingham, Ala., pending the outcome of conferences now being held with representatives of the Birmingham Railway, Light & Power Company in an effort to settle all differences between the city and company. The time limit for enforcing the ordinance was extended to May 15 by a unanimous vote of the commission at an adjourned meeting held on April 12. Conferences are scheduled to be resumed in a few days.

Three conferences have been held. All have been behind closed doors. No detailed announcement has been made of the matters gone into or of the progress of the discussions. No statements have been forthcoming from Lee C. Bradley, receiver, or from J. S. Pevear, president and co-receiver of the Birmingham Railway, Light & Power Company. Commissioner William L. Harrison has acted as spokesman following the conferences already held. He has announced that the conferences are being held in an effort to arrive at a general settlement of all issues between the city and company, including the jitneys, Jim Crow ordinance, street paving wanted by the city, certain rights-of-way wanted by the city from the company, installation of street lights and other matters.

Paving Question Up in Pittsburgh

Agreeing to co-operate as far as possible with the city in its general street repaving program this year, W. D. George and S. L. Tone, two of the three receivers of the Pittsburgh (Pa.) Railways, said at a conference with City Council it was doubtful whether the company would be financially able to complete the entire schedule. The receivers promised to confer with Public Works Director Charles A. Finley and submit a list of streets which the company will agree to improve between its tracks. Desirability of getting an early start on the schedule was pointed out by several members of Council.

The receivers have expressed a desire to abandon one of the tracks on East Carson Street, from Thirty-first Street to the city line, also one track on Sixteenth Street, between Liberty Avenue and the south approach to the new Sixteenth Street Bridge, and one track on East Street, North Side. To relieve traffic congestion on Sixteenth Street after the new bridge is opened, it was suggested both tracks there be abandoned and a new loop track be placed on Fifteenth Street. The receivers said they would have legislation prepared at once, authorizing this change.

Bill to Assess Property for Transit Improvements Introduced in Pennsylvania

Senator Edward W. Patton, of Philadelphia, on April 9 introduced a bill in the Senate of Pennsylvania proposing an amendment to the Constitution which would permit the enactment of laws authorizing assessments against properties particularly benefited by the construction of public improvements or utilities by the city of Philadelphia. It is provided that the money realized from such assessments shall be appropriated toward the cost of such improvements or the retirements of bonds issued for their construction.

The effect of such an amendment would be to permit the passage of laws assessing properties particularly benefited by transit improvements undertaken by the city. The resolution was sent to the committee on municipal affairs, of which Senator Samuel W. Salus is chairman.

The bill is somewhat along the lines of the suggestions contained in the "Rapid Transit Handbook," issued in May, 1922, by the Philadelphia Rapid Transit Company. It will be recalled that T. E. Mitten, president of the company, then advocated the assessment idea, saying that failure to assess some portion of the costs of added transit upon property owners who are specially benefited, exhausted the city's borrowing capacity, and thus prevented property owners from getting other improvements to which they might be properly entitled. The other conclusions contained in the "Rapid Transit Handbook" follow:

Higher fares discourage increased riding and interfere with the extension of home building areas, thus nullifying the main justification for use of municipal funds in aid of added transit.

Inability to collect sufficient revenue in fares to meet costs of operation, and in addition pay the interest on city investment, makes necessary the use of some other means to avoid overburdening city credit.

There being no inducement for further investment of private capital, municipal funds, or those secured through assessment of benefited property, must be depended upon for future transit development.

Subway and elevated lines relieve street congestion to advantage of general vehicular and pedestrian traffic. This, with increased values of public or other property, not subjected to special assessment for added transit, would justify general taxes bearing a share of the costs of rapid transit development.

Liberal treatment of earlier investment is justified because of the risks taken by original pioneers in developing transit: but a continuation of the present plan of building subways benefiting private property, which takes no risk whatever, is without any such justification.

A commission of public spirited citizens, representing the real estate and commercial interests, could, in co-operation with the city and the company, together best plan for added transit.

The Philadelphia Rapid Transit Company is repeating these conclusions just now in "Service Talks."

Chicago "L" Extension Under Way

Work on the contemplated extension to the Douglas Park branch of the Metropolitan West Side Elevated Railway of Chicago has been temporarily restrained by an injunction obtained by the Chicago & West Towns Railway. The contention is that the Elevated did not apply for a certificate of necessity and convenience for this extension. The West Towns Railway was required to obtain such a certificate before making extensions to its properties, and inasmuch as the new Elevated line extends into the former's territory it is felt that such a certificate should be obtained by the Elevated Railroad. No trackwork, such as rails and ties, is to be laid until after a hearing.

When completed the extension will add about three-quarters of a mile to the Douglas Park branch. Two new stations will be added, one at Ridgeland Avenue, Berwyn, the other at the terminal, Oak Park Avenue. Inasmuch as the Elevated owns the right-of-way, no destruction of buildings or confiscation of property is necessary. The track will be laid on the surface. The total cost will be about $60,000.

Key Route Receives New Turbo-Electric Ferryboat

The San Francisco & Oakland Terminal Railroad, Oakland, Calif., has received the first of the two new ferryboats which have been constructed to order in Los Angeles Harbor. The *Hayward* was brought up the Pacific Coast in tow of a seagoing tug, arriving at San Francisco on April 2, having made the 400-mile sea trip in two days. The new boat has turbo-electric drive. It is 240 ft. long and displaces a boat of 1,375 tons. The capacity of the new boat is 3,000. The second boat, the *San Leandro*, was expected at San Francisco within a month after its sister ship.

Conference Called on New York Utility Legislation

From the attitude of the Republican Assembly of New York, as indicated by a statement issued on the night of April 19 by Speaker Machold calling for a conference of Senate and Assembly leaders with Governor Smith on transit matters, it seems almost certain the New York State Legislature will not adjourn May 4 without having enacted a home rule transit law for New York City. While the Speaker would refer municipal ownership and operation of transit facilities to a referendum of the voters of New York City, it is not thought that particular feature will stand in the way of a compromise bill, provided regulation of service and capitalization are permitted to remain under stable state supervision. To do otherwise, the Speaker declared, would abrogate the principle of public utility regulation established by Governor Hughes sixteen years ago.

Rapid Transit Extension Planned for Interurban

The Ohio State Senate has passed the Lipp bill, giving City Councils power to fix rates of fare on elevated railroads in excess of 5 cents. Residents of the western section of Cincinnati thus appear to be assured rapid transit service from Anderson's Ferry into the heart of the city within a few months. The measure is intended primarily to give the Cincinnati, Lawrenceburg & Aurora Electric Street Railroad the right to extend its tracks into the city.

Residents of Delhi, Sayler Park, Anderson's Ferry and Fernbank already have prepared to build the extension and the West End Terminal Railway has been incorporated by H. Lee Early, Morgan Wamsley, Milton Sayler, and others to finance the project. It is estimated that the improvement will cost approximately $750,000.

Stanley Shaffer, counsel for the receivers of the Cincinnati, Lawrenceburg & Aurora Electric Street Railroad, said that the railway or the new corporation would apply to the City Council for a franchise as soon as the measure becomes a law. The rate of fare will be decided by agreement between the Council and the company. The desire is to make the cash fare 10 cents with tickets at the rate of 8 cents.

The Union Gas & Electric Company is prepared to supply power for the new line. The time for the trip from the center of the city to Anderson's ferry, the present Cincinnati terminal of the Cincinnati, Lawrenceburg & Aurora Electric Street Railroad, which now takes forty-five minutes by surface cars, will be reduced to fifteen minutes by the elevated service.

L. G. Van Ness, general manager of the Cincinnati, Lawrenceburg & Aurora Electric Street Railroad, said that the extension will be built by the West End Terminal Railway and leased to his company. Work on the extension will be started within the next sixty days.

Kansas Electrification Not Decided

Nothing definite has as yet been done regarding the carrying out of new electrification work in Kansas under the terms of legislation passed at the recent session of the Legislature. This legislation makes possible the lending of aid by municipalities toward the carrying out of such work.

One of the companies about which there has been talk in connection with the electrification rumors is the Arkansas Valley Interurban Railway. It is understood that more than a year ago officers of this company conferred with officers of the Union Pacific and the Missouri Pacific Railroad with a view to leasing branch lines of these companies, with the end in mind of electrifying the two branch lines from Newton to Salina, thus giving a through electric line from Wichita to Salina.

As the railroad map of Kansas shows the Union Pacific has a branch line from Salina south to McPherson, a distance of 34 miles, while the Missouri Pacific has a branch line from McPherson southeast to Newton, a distance of about 30 miles. The Arkansas Valley Interurban operates from Wichita to Newton. On their face the factors seem favorable for carrying out the work of tieing up these lines for electric operation, but many elements enter into the consideration of the matter, among them the increasing menace of the motor truck and the motor bus as possible active competitors for business. It is even believed in some quarters that the decision to go ahead with some of this work would long since have been made had it not been for this feeling of uncertainty as to the proportion of business which the railways could retain under competitive and, so far as the railways are concerned, restrictive operating conditions.

Conference on Rewriting of Purchase Contract for Seattle Railway

By unanimous vote, the members of the City Council of Seattle, Wash., have agreed to confer with the Stone & Webster bondholders, in an effort to obtain a rewriting of the purchase contract by which the city agreed to pay $15,000,000 for the lines now included in the system of the municipal railway. A resolution passed by the Council paves the way for obtaining, if possible, from the bondholders an extension of the time limit for retiring the municipal railway bonds, and authorizes the city officials to negotiate with Stone & Webster officials with that end in view.

Copies of the resolution have been mailed to A. W. Leonard, president of the Puget Sound Power & Light Company, Seattle representative of Stone & Webster, and to the Equitable Trust Company, New York, trustee, to whom the interest is remitted by the city treasurer. Mr. Leonard has agreed to take the matter up with his company officials. Councilman C. B. Fitzgerald, who introduced the resolution, said that its object was to ascertain the attitude of the bondholders on a proposal to double the time limit on the remaining $13,334,000 of bonds, which would mean an extension of sixteen years, or a limit of thirty-two years from date.

Complete figures on receipts of the Seattle Municipal Railway for March, under the 5-cent fare, which went into effect on March 1, bear out the trend indicated at the beginning of the 5-cent fare period and an actual average loss daily for the thirty-one days is shown to be $4,475, or $138,725 for the month. In a letter to the City Council last November, Superintendent of Public Utilities G. F. Russell, stated that he anticipated an increase of 13 per cent in passengers under the 5-cent fare, but the actual increase during March amounted to only 8 per cent.

Through action of the City Council in appropriating $50,000 from the operating fund to the depreciation fund by ordinance, another warrant crisis looms in the finances of the railway system for May. At present, the passenger revenues of the system are barely sufficient to take care of maintenance and operation, and the ordinance appropriating $50,000 to repay money borrowed from the depreciation fund late in January, when the department faced a warrant crisis, will make the operating fund short. By May 25, next pay day, the operating fund will be short and warrants will be necessary for part of the money due in salaries or supplies, unless the city revenues show marked increase.

The appropriation of $50,000 is to take care of contracts signed for the improvements to Westlake Avenue along Lake Union and a strip of Union Street.

In the meantime, the Council has requested by ordinance, a complete report on the finances of the street railway system, with a detailed survey of the entire situation. Municipal railway officials are compiling the report which will be submitted in the near future, and which is expected to include recommendations from both the utilities and railway department heads that the 5-cent fare be discontinued.

Fifty-one Years an Employee

What is probably the longest record of continuous service with a traction company in the Middle West has been made by A. W. Lentz. He has served with the Indiana Service Corporation, Fort Wayne, Ind., and its predecessors for a period of fifty-one years and five months. This fact came out recently on the occasion of Mr. Lentz's eightieth birthday anniversary. During Mr. Lentz's connection with the company the ownership of the property changed several times and he served in many different capacities. At the present time he is a timekeeper in the south carhouse of the corporation.

In acknowledgment of the faithful service of Mr. Lentz, Samuel W. Greenland, general manager of the company, sent him the following letter:

> My dear Tony:
> I note that tomorrow you will have reached another milestone in your life. I desire to congratulate you and wish you continuation of health and happiness, with the hope that you may have many more birthdays.
> It is certainly very pleasing to note that you are the oldest employee in the service of this company and its predecessors. Continuous service for fifty-one years and five months is certainly a fine record, especially when account is taken of the high-grade service you have rendered.
> For this company and the former companies with which you have been associated I want to thank you for the loyal manner in which you have served these fifty-one years.

Surface Lines Extend One-Man Car Operation—Effective Monday, April 16, the Chicago Surface Lines equipped eight routes with one-man cars. This brings the number of routes so operated up to twelve and a total of forty-seven one-man cars in operation. Of the twelve routes, six are equipped with single-truck cars, while the remaining six are equipped with double-truck cars of the type which can be operated by either one man or two men.

Los Angeles Campaign Intense

Mayor and President of Utility Board Oppose Majority Proposal to Force Large Program on Companies

Mayor Cryer of Los Angeles, Calif., claims that Commissioners of Public Utilities Bogardus and Kennedy, who form a majority on the board, were without authority in rejecting as "unsatisfactory as a whole" the offers of the Pacific Electric Railway and Los Angeles Railway companies for a $6,000,000 improvement program of track extensions and motor bus service. The mayor states that the companies should be given a chance to make good; that he has always found it wise policy to accept such offers for much needed improvements in street car service, then later barter for further improvements.

President Leeds of the Board of Public Utilities was not a party to the communication to the street railway companies, as he does not agree to all of the demands made by the majority of the board. He appeared before the City Council and requested it to instruct the Board of Public Utilities to accept the improvement program offered by the companies. It is claimed the majority members of the board exceeded the law in addressing the companies by letter without the approval of the City Council and Mayor.

CITY COUNCIL CAN FORCE ACCEPTANCE OF PROGRAM

The city charter gives the City Council power to compel the board to accept the companies' proposals. Regardless of differences within the city government, formal applications to the City Council and the board are being prepared by the railways for permission to carry out their proposed $6,000,000 program of rail extensions and motor bus "feeder" lines.

The Board of Public Utilities, however, can of its own motion issue the rail lines motor bus permits. The program of improvements of the Los Angeles Railway and the Pacific Electric Railway for motor bus lines and rail extensions was reported in ELECTRIC RAILWAY JOURNAL, April 14, 1923.

The majority members of the board claim that if they accept any part of the offer of the rail lines independent motor bus companies will be permitted to operate their lines. Commissioner Bogardus states that no motor bus permits will be given the Pacific Electric by the board, but that several permits will be given the Los Angeles Railway, and that the majority will approve the rail extensions proposed by the Los Angeles Railway. Permits will also be given the People's Motorbus Company and the Gulick Glendale bus system.

The City Council has appropriated $1,500 to defray the expense of Commissioner Bogardus and Chief Engineer Lorentz of the board to visit various Eastern cities where motor buses are in operation to study the situation.

W. G. McAdoo, counsel for the People's Motorbus Company, is actively campaigning for the issues in favor of his company that appear on the May first ballot. He nightly is addressing various associations where there is agitation for the motor bus.

The Traffic Betterment Association, an organization of prominent business and professional men, believes that additional motor buses would add to the badly congested streets of the city, and states that the People's Motorbus Company is now seeking to amend the ordinance against jitney buses approved by the voters in 1917, so as to permit them again to clog up the streets with unnecessary traffic.

The Los Angeles Chamber of Commerce has made a public statement that it is opposed to the McAdoo bus system being admitted to the city street, recommending that the street car companies be given time to make good on their offer to make improvements.

News Notes

Strike Over.—A settlement has been practically reached between former employees and the management of the Steubenville, East Liverpool & Beaver Valley Traction Company, East Liverpool, Ohio, which will terminate a strike which lasted nearly 350 days.

Bill Against One-Man Cars in Wisconsin.—A bill has been prepared for introduction into the State Legislature at Madison, Wis., calling for the complete abolishment of one-man cars in Wisconsin and compelling railways to have a motorman and a conductor on every car.

Urges Trolleys for Motorists.—H. B. Weatherwax, vice-president of the United Traction Company, Albany, N. Y., has urged on motorists the slogan of "the trolley car for business, the automobile for pleasure." This, he believes is the solution of the traffic congestion problem which will help make for successful operation of the railway lines.

Confer on Wages.—Conferences are being held between the management and employees of the East St. Louis & Suburban Railway, East St. Louis, Ill., looking toward a new wage agreement. The present agreement terminates on May 1. It calls for a scale of 51 cents an hour, which is a reduction of 19 cents from the scale in effect during 1922.

Utility Department Created at Houston.—A Department of Public Utilities has been created within the city government of Houston, Tex., and a supervisor of public utilities is to be appointed who will have supervisory powers over the various utilities operating in the city. Under the agreement each of the large utility companies operating in Houston will contribute $5,000 to a fund to be used in financing the operation of the new department.

Foreign News

The council of the Tramways & Light Railways Association have instituted a standing research committee with power to appoint sub-committees consisting of technical men, whether members of the association or not, and to delegate inquiries to these sub-committees. Questions regarding rolling stock have been referred to the standing research committee with instructions to co-operate with the Municipal Tramways Association. A joint committee of representatives of two associations has accordingly been formed.

The chairman of the London United Tramways Corporation, Sir William Ackworth, in addressing the recent annual meeting of the shareholders, stated that the result of experiments with a one-man car had been quite satisfactory, and before long that type of car would be in use on the less profitable routes. A few one-man cars are in use in other parts of Britain.

At a recent meeting of the London County Council the chairman of the highways committee stated that during the twelve months ended Jan. 31 last 410 persons were knocked down by vehicles passing London County Council tramcars engaged in setting down or taking up passengers. This is an argument for the proposal to have legislation to deal with the matter. Glasgow already has powers to compel vehicles to refrain from passing on the near side of cars at stopping places.

London County Council has accepted a tender by the North Eastern Steel Corporation for the supply of 4,900 tons of tramway rails and fastenings at £58,351. The lowest tender, £41,919, was for rails made in Germany. Preference was given to the British-made rails.

Speaking in the House of Commons in February, Sir M. Barlow, Minister of Labor, mentioned that the London underground railway companies were making application under the trade facilities act for a government guarantee on an additional proposed capital of £8,000,000. This was contingent on the companies getting a Parliamentary bill passed, which they were now promoting, to authorize extensions of their undertakings. (These proposed extensions have already been dealt with in these pages.)

The ingenious London Underground Electric Railway people have been treating the public to a few interesting statistics. The latest point made is that in twenty-four hours, from midnight to midnight, the underground lines performed work of 5,500,000 ton-miles, including weight of trains and passengers. It is blandly added that this is equivalent to moving an underground car a distance greater than from the earth to the moon and back, or to moving 220 tons (a train of ten cars loaded with passengers) around the world.

Financial and Corporate

Strike Reduces Earnings

Virginia Railway & Power Company Has $217,159 Less Net in 1922 than in 1921

The gross operating earnings of the Virginia Railway & Power Company, Richmond, Va., of $9,513,095 decreased over the previous year $660,239, or 6.49 per cent, while the operating expenses decreased $442,502, or 6.26 per cent. The gross income from all sources amounted to $3,123,970, a decrease of $217,159 as compared with 1921.

The expenditures for maintenance of way and equipment amounted to $782,326, or 17.62 per cent of the gross railway earnings as against $1,060,593, or 19.5 per cent for the previous year.

In addition to the regular charges for maintenance of way and equipment an amount of $1,422,500 for the year was included in operating expenses and credited to the depreciation and renewal reserve, being 5½ per cent on the depreciable property in the light and power department, and 3 per cent of the depreciable property in the railway department, and which is in lieu of the 6 per cent of gross earnings annually set aside before the readjustment of the property account as of Jan. 1, 1922, under the Stone & Webster inventory and appraisal. The balance to the credit of the depreciation and renewal reserve on Dec. 31, 1922, was $4,115,952.

The reserve for injuries and damages on Dec. 31, 1922, was $170,427 against $176,667 on Dec. 31, 1921.

The expenditures during the fiscal year ended Dec. 31, 1922, for additions, extensions and betterments to property and charged to capital account, amounted to $1,252,414, of which $497,766 was for the railway department.

During the year a dividend of 6 per cent declared in 1921 on the preferred stock, and payable in preferred stock, was paid by the issuance of 4,686 shares of preferred stock and scrip certificates.

During the year the company funded a considerable part of its capital expenditures through the sale of a large block of its treasury bonds to a syndicate of bankers, and the full dividend of 6 per cent on the preferred stock was declared out of earnings for 1922, payable in cash, 3 per cent on Jan. 20, 1923, and 3 per cent on July 20, 1923.

Explaining the reduction in gross earnings, Thomas S. Wheelwright, president, states:

Beginning Jan. 16, there was a strike of railway employees throughout the system which resulted in a temporary interruption in the street railway service, but upon its restoration the company established the policy of the open shop and this has resulted in a marked improvement, not only in the morale of the men, but in the service furnished to the public.

Material progress has been made during the year in getting the railway lines of the system on an economically sound basis. While the applications for revised franchises are still pending before the several local Councils, the Supreme Court of the State has recently declared the jurisdiction and control of rates of public utilities to be vested in the State Corporation Commission. Under the principle established, it is the opinion of counsel that the rates for all service rendered by this company are subject to the jurisdiction of the commission, with the possible exception of transportation rates in Richmond under certain franchises now in process of adjustment. The commission has for several years exercised its control as to rates for light and power.

In Petersburg permits have been granted for the operation of rail-less cars to the Walnut Hill section, a popular and growing suburb of that community, replacing tracks over a large portion of the route. The cities of Norfolk and Portsmouth are also giving favorable consideration to the operation of rail-less transporation and it is believed that arrangements will soon be made for the operation of one or more rail-less lines in each of these cities.

With the addition of seventy Birney safety cars during the year the company has 200 safety cars now in operation throughout the system.

The company built 11,365 ft. of new track in Richmond and 3,907 ft. in Norfolk, while in Richmond 9,156 ft. of track was abandoned. Track was rebuilt in various parts of the system totaling 40,641 ft.

VIRGINIA RAILWAY & POWER CO.
COMPARATIVE COMBINED INCOME ACCOUNT

	Year Ended Dec. 31, 1922	Year Ended Dec. 31, 1921
Gross Earnings:		
Railways	$4,438,823	$5,439,623
Electric light and power	5,074,272	4,733,710
Total gross earnings	$9,513,095	$10,173,334
Operating Expenses:		
Railways	$3,793,079	$4,560,917
Electric light and power	2,832,080	2,506,744
Total operating expenses	$6,625,159	$7,067,662
Net from operation	$2,887,936	$3,105,672
Total other income	$236,034	$235,457
Gross income	$3,123,970	$3,341,129
Taxes and Licenses:		
Railways	$305,550	$374,640
Electric light and power	179,240	167,871
Federal income	183,798	155,600
Total taxes and licenses	$668,588	$698,112
Gross income over operating espenses, taxes and licenses	$2,455,381	$2,643,017
Interest on bonds	$1,163,804	$1,163,052
Sinking fund payments	$205,613	$202,500
Rental paid Norfolk Railway & Light Co.	$99,000	$99,000
Miscellaneous interest	51,083	95,894
Fixed charges, rentals and interest	$1,519,501	$1,560,447
Surplus	$935,880	$1,082,570
Amortization of discount, etc., on bonds sold and miscellaneous net charges to surplus	$38,812	$92,471
Surplus for the year over all charges	$897,067	$990,098

RAILWAY STATISTICS FOR YEAR ENDING DEC. 31, 1922
VIRGINIA RAILWAY & POWER COMPANY

	Richmond Dec. 31, 1922	Norfolk Dec. 31, 1922	Total* Dec. 31, 1922
Revenue passengers	35,486,265	27,662,319	71,950,905
Revenue transfers	.....	.....	.....
Transfer and free passengers	11,606,879	4,491,473	17,102,151
Total passengers	47,093,144	32,153,792	89,053,056
Percentage of revenue passengers using transfers	31.92	15.07	22.86
Average fare per passenger including transfers and free	$0.0443	$0.0512	$0.049
Car-mileage	7,355,063	5,465,310	15,409,697
Car-hours	930,386	630,806	1,847,825
Average passengers per day	129,023	88,092	243,981
Total revenue per car-mile	$.2865	$.3065	$.2881
Total revenue per car-hour	$2.265	$.2655	$2.402
Operating expenses per car-mile	$.2414	$.2562	$.2462
Operating expenses per car-hour	$1.909	$2.219	$2.053

* Includes Portsmouth, Petersburg and Interurban divisions.

St. John Property to Be Rehabilitated

The *Financial Post* of Toronto, Can., in commenting on the sale of the New Brunswick Power Company to the Federal Light & Traction Company, New York, N. Y., says that several million dollars will be spent in rehabilitating the St. John property and developing an extensive water power site.

According to the *Post* the sale involved the purchase of the $2,000,000 common stock of the New Brunswick Power Company at $15 a share which amounted to about $300,000.

The New Brunswick Power Company operates the light and power, distribution system, gas and electric railway in St. John and vicinity. The company has outstanding $1,869,000 of 5 per cent bonds due 1937, $1,000,000 of 7 per cent cumulative first preferred and $350,000 of 7 per cent non-cumulative preferred. The bonds and preferred stock are largely held in New England.

1922 Record Year for Traffic

The total gross earnings of all the companies constituting the system operated by the Columbia Gas & Electric Company, Charleston, W. Va., for the year 1922 amounted to $35,322,087. Gross earnings of railways and other operations outside of electric and gas operations were $2,248,429, against $2,170,258 for the year ended Dec. 31, 1921.

The company operates the Cincinnati, Newport & Covington Railway, which does the entire electric railway business in Covington, Newport and adjacent municipalities in northern Kentucky. The railway during 1922 carried a larger number of passengers than ever before in its history and through economic operation shows an increase in net earnings greater than in gross.

The report made to the stockholders says that it is gratifying to note the improved results and prospects of this branch of the company's activities.

Sale of Securities by Ads Is Cheapest Way

During the last four years and eight months the Milwaukee Electric Railway & Light Company and its affiliated corporation, Wisconsin Gas & Electric Company, advertising exclusively in Wisconsin newspapers and backing up their advertising with a small force of field salesmen, have sold $12,400,000 of short-term notes and preferred shares to more than 25,000 Wisconsin men and women, of whom more than 20,000 are residents of Milwaukee city and suburbs.

All of these securities were sold at par for cash. Total selling cost, for the $12,400,000, was a shade over 3½ per cent of par. It is believed this establishes a record for the United States in obtaining, at so low a cost, any comparable amount of new capital to finance public utility growth. Costs at this time are higher, averaging 4½ per cent of par, due to increases in advertising rates and other items of expense.

Sales at the counter and by mail are attributed solely to advertising. A certain percentage of sales made by field salesmen is credited to the advertising. Experiments ever periods of several weeks have proved that field sales shrink approximately 40 per cent when newspaper advertising is stopped. Over the whole term of four years and eight months counter and mail sales have accounted for more than $6,500,000 of the $12,400,000 total.

D. E. Callender, general manager of Wisconsin Gas & Electric Company, is the head of the securities department of the two companies. His company is believed to be the only large utility in the country which has financed its growth solely, during the last five years, by selling its new securities directly to its customers and other residents of its service territory. Each year the Milwaukee Electric Railway & Light Company finances a larger portion of its new capital needs in this way. Mr. Callender believes that by Dec. 31, 1923, the two companies will have more than 30,000 Wisconsin investors.

Service Will Be Resumed in Bridgeton

Resumption of electric railway service in Bridgeton, N. J., is assured through the financing of a new company to restore the service abandoned by the Bridgeton & Millville Traction Company nearly a year ago. Some time ago a citizens' committee, led by members of the Bridgeton Chamber of Commerce, started work to finance a loan for the Cumberland Traction Company, which took over the line from Bridgeton to Millville. The Cumberland Company agreed to run the line if the bonds to the amount of $60,000 could be sold. The committee has sold within $3,700 and agreed to underwrite the balance so the road could be started again. At a mass meeting of the residents of Bridgeton a preference was expressed for the electric railroad over the motor buses. The J. G. Brill Company showed its faith in Bridgeton by starting several months ago to build cars subject to countermand of the order, and these cars will soon be ready. Clayton M. McPherson, manager of the new company, has had 6,000 ties cut in the woods near Back Neck and expects soon to be laying the ties on North Laurel Street, Bridgeton.

Memphis Street Railway Receivership Lifted

On April 11 the Memphis (Tenn.) Street Railway for the first time in several years, was operated free from the control of the Federal Court. The receivership ended Tuesday at midnight. Frank Elgin and T. H. Tutwiler had been receivers. Under their jurisdiction many improvements were made to the property, some lines were re-routed, transfer points were changed and in a general way service was benefited.

Judge Ross of the Federal Court on Tuesday afternoon signed an order relieving the two receivers. The application for their removal was filed by Lovick P. Miles, of Wright, Miles, Waring & Walker.

The railway went into the hands of receivers, Jan. 20, 1919, on the application of the American Cities Companies. The petition of Mr. Miles recited that all past due and unpaid obligations of the local company have been met and paid, and that there were no outstanding obligations of any nature.

The Memphis Street Railway will operate under the same officers who served prior to the receivership. T. H. Tutwiler, who served as receiver, has been re-elected president; E. W. Ford, who has been superintendent, vice-president; L. Lemay, secretary and treasurer.

Mr. Tutwiler is also president of the Memphis Power & Light Company. This latter concern has purchased the power plant of the railway for $1,568,000.

The directors of the railway are: H. C. Abel, E. B. Odom, C. E. Grosbeck, T. H. Tutwiler, E. W. Ford, W. W. Mallory, C. W. Butler, F. S. Elgin, A. L. Parker and J. M. Walker. One vacancy remains on the board.

The directors of the Memphis Power & Light Company are R. Leedy Matthews, H. C. Abel, C. J. Haase, F. B. Odum, C. E. Grosbeck, F. N. Fisher, J. R. Flippin, J. P. Norfleet, J. F. Raimer, Henry Wetter and T. H. Tutwiler. Mr. Matthews is a new member of the board. The light and power company plans to spend $4,500,000 on its new plant within the next two years.

The State Public Utilities Commission on April 8 approved the sale of the railway's power plant to the electric company. By permission of the state commission the railway for some time has been charging a passenger rate of 7 cents.

Indianapolis Street Railway Has Good Year

The Indianapolis (Ind.) Street Railway has filed with the Public Service Commission of Indiana its report for 1922. The statement shows gross income of $1,078,301, or $241,605 more than 1921. The report indicates a nice improvement in the company's business. Two dividends of $75,000 each were paid on preferred stock in 1922 on account of back dividends due from 1921. The company officials, headed by Robert I. Todd, president, say the business thus far this year is 5 per cent better than 1922. The total revenue for 1922 was $5,541,445, or $309,581, more than in 1921. The total revenue from passenger fares was $5,000,556, from rent of track and equipment for interurbans $215,329, for rent of other property $248,021. Total operating expenses were $4,057,361 or $94,917 greater than in 1921.

The operating ratio was 73.16 per cent.

The report shows out of the gross income of $1,078,301, payment of the following:

Rent for leased cars	$ 10,000
Interest on funded debt	633,198
Interest on unfunded debt	4,144
Miscellaneous debits	4,853
Total	$652,196

With the foregoing total deducted from the gross income there remained an income balance of $426,104.

While the number of revenue passengers on city cars in 1922 was about 5,000,000 greater than in 1921, 400,000 fewer persons came into Indianapolis by interurban in 1922 than in 1921.

This is attributed to the increase in buses operating between Indianapolis and outlying cities and towns. The number of transfers on city cars did not increase in 1922 over 1921 in the proportion the number of revenue passengers as a whole increased.

The following figures compare the two years as to number of passengers:

	1922	1921
Revenue passengers city company	92,078,151	87,086,415
Transfers	19,393,675	19,321,777
Passengers Interurban cars	6,431,051	6,854,038

The preferred stock is $5,000,000 at 6 per cent. This makes the dividends $300,000 a year. They are payable quarterly. Dividends were suspended for March, 1921, and none was paid until September, 1922. The preferred stock dividends are cumulative and the two $75,000 dividends paid in 1922 applied on amounts due in 1921. On March 1, 1923, another $75,000 dividend was paid. This was in settlement of the amount due stockholders on Sept. 1, 1921. At the present time six quarterly dividends are unpaid.

When the Indianapolis Traction & Terminal Company was the operating corporation it paid $300,000 annually as a lease rental to the Indianapolis Street Railway. This sum was in turn

distributed as a 6 per cent dividend on the $5,000,000 of common stock. When the old Indianapolis Street Railway and the Indianapolis Traction & Terminal Company were consolidated, the $5,000,000 of common of the former was exchanged for $5,000,000 preferred.

In the order of the Public Service Commission in 1919, authorizing the consolidation, the commission directed that sinking fund payments be suspended until 1923 and that the amounts that would have been paid into sinking funds be expended for betterments and improvements. These payments amount to about $130,000 a year.

The rate of fare in 1922 was 5 cents with 2 cents additional for a transfer. For a short time in 1921 the fare was 6 cents, with 1 cent additional for a transfer. Some of the improvement in the financial condition of the company is attributed to the removal of unfair jitney competition under the regulatory ordinance passed by the City Council in 1921.

City's Valuation of Philadelphia Rapid Transit Is $119,887,000

A revised statement of the valuation of the Philadelphia (Pa.) Rapid Transit Company by the city was recently presented by Robert M. Feustel to Commissioner Clement which shows an increase of $3,383,710 over the figures in a former report. The new list places the city's estimate of the cost of reproduction of the property now, based on prices prevailing in the first quarter of 1922, at $119,887,752. The original report set the figure at $116,504,042.

In explaining the matter to Commissioner Clement, Mr. Feustel testified that he had not changed the basis on which he estimated the figures originally.

The figures in the original report were compiled at minimum. The estimated original cost of existing property after deducting depreciation was increased $1,155,221, making it $90,179,742. The other changes varied from 11/25 of 1 per cent to 2¼ per cent.

The $3,383,710 increase was figured at 3 per cent.

No Special Purchase Fund Required

The suit of the Puget Sound Power & Light Company against the city of Seattle, to compel the city to set aside gross earnings of the Seattle (Wash.) Municipal Railway to pay interest and sinking fund on $15,000,000 bonds of the railway held by the company, will not be decided by the United States Supreme Court, which on April 16 denied a petition for a writ of certiorari.

The Federal District Court had held that the city must set aside gross earnings for these payments before paying operation and maintenance expenses. The Circuit Court of Appeals reversed this ruling on the ground that a state statute provides adequate remedy if proper payments are not made. The action of the Supreme Court permits the Circuit Court's decision to stand.

In its petition, the company, which sold the railway properties to the city, alleged that a special fund for the bonds was not being set aside by the city before paying operation and maintenance charges, and the question of whether the municipal railway was charging sufficient fare to insure payment was injected into the suit.

Railway Securities at Auction

Electric railway securities sold at auction by A. H. Muller & Sons, New York, on April 19 were as follows:

105 shares Buffalo & Lake Erie Traction Company common, 100 shares Buffalo & Lake Erie Traction Company, preferred, $2 lot.

$2,000 Cleveland, Elyria & Western Railway first mortgage 5s of 1920, extended at 7 per cent to 1923, certificates of deposit, 65 per cent.

$10 Cities Service Company scrip for preferred stock, $5 lot.

5 shares Cities Service Company preference B stock, $12½ per share.

Deficit Reported for February.—Although there was a gross surplus of $916 in the earnings of the Tacoma (Wash.) Municipal tideflats line during February, the payment of interest on bonds and loans from the Emergency Fleet Corporation and payment of gross earnings tax caused a deficit of $2,572, according to the city controller's report. There were 199,742 passengers carried.

Balance Shows Decrease.—For the year ended Feb. 28, 1923, the Reading Transit & Light Company, Reading, Pa., reports a net income of $246,527, against $263,462 for the year ended Feb. 28, 1922. After providing for dividends on the preferred stock the balance for the period ended February, 1923, was $129,412, against $146,347 for the year ended February, 1922.

Earnings Satisfactory.—The report of the San Francisco-Oakland Terminal Railways Company for 1922 shows a net operating income after taxes, operating expenses and depreciation of $1,437,188. Gross operating revenues amounted to $6,922,348 and operating expenses including depreciation to $5,202,236. Net earnings from operation were $1,720,112.

Bonds Pledged for Loans Held Valid.—In an opinion filed in the United States District Court at New York Judge Mayer holds to be valid $7,079,000 of 4 per cent Brooklyn Rapid Transit refunding mortgage bonds pledged with various banks and trust companies prior to receivership. The loans, most of which were made in 1917, cover a period from 1914 to 1919.

Traffic Heavy in Shortest Month.—The Municipal Railway of St. Petersburg, Fla., carried approximately 515,000 passengers during February, the greatest number ever handled on the local lines within the shortest month. The figures represented an increase of 24 per cent over the corresponding month of 1922. Because of the tourist patronage greater records for March are expected.

Equipment Certificates Being Offered.—Clark, Dodge & Company, New York, N. Y.. are offering at 100 and accrued interest equipment trust 6 per cent gold certificates, maturing on March 15, 1925 to 1928. The yield is 6 per cent. These certificates are issued under the Philadelphia plan and are to be secured by 100 new completely equipped steel passenger cars at approximately 75 per cent of cost.

Net Income and Traffic Increase.—For the three months ended March 31, 1923, the Philadelphia (Pa.) Rapid Transit Company reports a net income of $644,175 against $614,831 for the same period ended March 31, 1922. Passengers carried totaled 222,850,564 against 202,286,650 for the period from January-March, 1922. The passenger revenue for the first three months of 1922 amounted to $9,972,001 and for this year $10,758,622.

Operation to Suspend.—Officials of the West Chester, Kennett & Wilmington Electric Railway, operating between Kennett Square, Pa., and Wilmington, Del., recently announced that operation would be suspended because it was a losing proposition. It is said that plans are being formed by persons interested in the continuation of the line between Brandywine Springs and Kennett Square to have the road taken over by another railroad company and operated as a branch. The discontinuance will not affect the road between West Chester and Kennett Square, which is operated by the West Chester Street Railway.

Offers Preferred Stock.—Bonbright & Company, New York, N. Y., are offering $6,000,000 of the 7 per cent cumulative preferred stock of the Public Service Electric Power Company. The price is $98.75 a share and accrued dividends to yield about 7.10 per cent. The proceeds from the sale of this preferred stock, together with that from the sale of $14,000,000 first mortgage gold bonds and 300,000 shares of no par value common stock, already underwritten, will provide funds equal to the estimated cost of the new power plant, and any excess cost will be paid by the lessee. The new company will supply power to the Public Service Railway, both companies being included in the system of the Public Service Corporation of New Jersey.

Seeks Abandonment of Railway.—Claiming that it has been losing money for the past ten years and specifying the exact loss during 1922 as $24,000, the Trinidad Electric Transmission, Railway & Gas Company, has asked the Colorado Public Utilities Commission for permission to abandon all local and interurban railway service. It has been several months since any street cars were operated in the city of Trinidad. When the railway quit, the Trinidad Motor Bus Company started three twenty-passenger buses and has kept them in operation. Certain city lines were abandoned in March, 1922, in accordance with a decision of the commission and since that time hourly service on the interurban lines is all that Trinidad has had.

Traffic and Transportation

Saginaw Moves for Settlement

New Mayor Says Transportation Problem Is Most Important Before City

With the appointment of Frank A. Picard as city attorney, friends of street car-bus transportation in Saginaw, Mich., are looking forward to an early solution of the difficulties confronting Saginaw since bankruptcy proceedings in August, 1921, caused a suspension of electric railway service.

Naming the city attorney is the first step of the new City Council toward public conferences between the grantee, Otto Schupp, and whomever he may select to meet with the Council and prepare a franchise to be submitted to the people.

This action is in line with the inaugural message of Mayor Albert W. Tausend. Mayor Tausend and Councilman William J. Wolf were elected on street car platforms and the Mayor at the first meeting of the present Council said in regard to transportation:

SUGGESTS CONFERENCES TO MODIFY FRANCHISE

Of all the problems fronting us, two seem most important—water and transportation—and of these transportation seems to offer a more immediate solution because it has been much in the public mind of late, and because there seems to be but a few adjustments to be made to produce a franchise that would be acceptable.

I have in mind the thought that there are three parties to the question, the people, whose rights must be protected, and whose wishes must be carried out when expressed; the Council which acts as agents for the people; and the grantee, who must be looked to to accept the franchise and carry out its provisions.

A franchise can properly come from one of two sources, either from the Council acting for and on behalf of the people, or for the grantee who is to carry out the contract.

I would suggest therefore that the Council with the city attorney summon the grantee and such representatives as he may desire into public conferences with the Council for the purpose of endeavoring to bring about such modifications in a franchise as will be fair to the people, fair to the grantee, assure its adoption, and bring a speedy return of adaquate transportation facilities to our community.

Within a few days the Council will discuss the situation and will then name one of its members to interview the grantee and arrange for the conferences at which time the franchise will be framed along the lines which have been outlined.

OUTLOOK APPEARS TO BE IMPROVED

Mayor Tausend's election as chief executive has had a reassuring effect upon the public mind and many believe the small number of the electors who have been able to defeat the will of the majority because of the 60 per cent vote required for the adoption of a franchise will be won over to the affirmative side of the question and the difficulties over transportation will be brought to an end.

An attempt was made to submit a municipal ownership plan to the electors, but it failed to get by the Council. Commissioner George Phoenix, who opposes every franchise so far offered, fathered this ordinance, but it was never read, his measure failing to attract a majority vote even for consideration of his proposal.

Because of this and the attitude of the other members it seems to those who favor the return of electric railway service that a satisfactory solution will be worked out and approved.

The new Mayor has also served notice on the chronic "no" faction in the city that Council members have been elected to perform certain duties and that no outside interference such as was countenanced by the last Council will be permitted in any way under the new order of things.

COUNCIL SEEKS FIFTEEN-YEAR GRANT

Members of the City Council and Otto Schupp, grantee under the recent franchise defeated by a few votes, conferred on April 18 relative to modifications with a view of again submitting a street car-bus franchise at an early date.

The Council favors a fifteen-year grant, with the rate of fare fixed to run the full period to avoid referring the fare question to the public utilities commission or writing the upset value in the contract. If the bond owners protective committee is unable to meet the terms, this does not mean the end of negotiations.

Mr. Schupp expects to be in New York during the week commencing April 22 to confer with the interests who are preparing to finance the project. It is expected that as a result of his visit to New York a conference will be held in Saginaw upon his return.

Great Reduction Noted in Accident Costs in Philadelphia

J. J. K. Caskie in the April 16 issue of *Service Talks*, the official publication of the Philadelphia (Pa.) Rapid Transit Company, gives some statistics on accident prevention under Mitten Management. In 1911 there were 517,697,478 passengers carried on the lines of the Philadelphia Rapid Transit Company. Nearly 6 per cent of the earnings of the company for that year was spent in paying accident costs, and 4,824 negligence suits were pending in the courts. In 1922 848,883,512 passengers were carried while only 3.05 per cent of the earnings was spent for accidents and only 1,313 suits remained unsettled in the courts. This reduction is significant in view of Mr. Caskie's statement that in 1911 there were only 40,000 automobiles licensed in the state and now there are more than 800,000.

Safety Work Progressing in Nashville

The Nashville Railway & Light Company, Nashville, Tenn., has been conducting a safety campaign which the company reports is progressing splendidly. The number of accidents is much smaller this year than last year. A bonus has been arranged for distribution to employees at the end of the campaign. A number of safety pamphlets have been given out to the schools of the city, and short talks and readings have been made before the pupils regarding safety measures.

The Nashville Automobile Cluh has co-operated and, as a result, new traffic laws have been put into effect on the main thoroughfares of the city, to reduce accidents and, at the same time, speed up traffic. A number of car stops have been eliminated safety zones have been placed around stations, and one-way streets and right turns for vehicles have been designated.

Since these regulations have been put into effect there has been a considerable reduction in the number of accidents. The work which the Nashville Railway & Light Company is doing is part of a campaign which is to be carried on throughout the State of Tennessee.

Seattle & Rainier Valley's Difficulties Reviewed at Hearing

Toward the close of the hearing before the Department of Public Works, upon a petition of residents of the Rainier Valley district for a reduction in the 8½-cents fare charged by the Seattle & Rainier Valley Railway, Frank R. Spinning, supervisor of the department, stated that the testimony showed that the company was not only unable to pay its taxes, but that it was indebted to its owners. Further, that it was the function of the State Department of Public Works to see that public utilities were able at least to make a reasonable return upon their investments.

The residents of the district complained that with the rest of the city enjoying a 5-cent fare under municipal operation, the higher rate was working against the development of the valley district, and driving people away. The company submitted testimony intended to show that it could not operate under a reduced fare, maintain its tracks and equipment as required by law, and pay its way. Figures were introduced to show that even with a 15 per cent increase in traffic, under a 5-cent fare, the company would face a yearly deficit of approximately $150,000. Testimony was given that the company had never paid dividends, and had only paid interest upon certain of its bonds.

Officials of the company declared that if permitted to maintain the present fare for another two years, they would be financially able to make needed improvements and betterments, clear away outstanding debts, and be in better shape to meet rate reductions.

It will probably be several weeks before a decision is rendered.

More Improvements for New York Elevated

In addition to the extensive increases of the train services on the elevated railroad lines, the Interborough Rapid Transit Company, New York, N. Y., has announced other features of the contemplated program of improvement. Previous statements have had to do with added service. The new statement relates to features which will make the service more attractive. It was made by the company on April 16.

The company has arranged to expend a very considerable sum for painting a substantial part of the elevated structures and redecorating a large number of stations, and to begin a program of vestibuling of the trains and repainting of cars, inside and out. The elevated colors, hereafter, will be orange and black. The major color for the outside of the cars is the golden rod shade of orange used by the Chesapeake & Ohio, the St. Paul and other steam railroads. Lettering will be done in black. The woodwork in the lower part of the interiors will be finished in mahogany tones, and the ceilings will be white. This will make the cars not only brighter, but will materially improve the lighting. The painting of the stations has begun with the Thirty-eighth Street station, on Sixth Avenue. The station colors will be in harmony with those of the cars.

The company has arranged to issue a small pamphlet showing the frequency of service and running time of elevated trains between many points to and from which travel is greatest. Contrary to a somewhat general impression, the company points out as a fact that in a very large proportion of cases the elevated offers a service that is not only just as rapid but more frequent than can be found by any other route, to say nothing of less crowding, more comfort and an all open-air ride. The scheduled speed on the elevated is 25 m.p.h. for express trains and 15 m.p.h. for local trains. The company has adopted for the elevated the slogan: "Ride on the Open-Air Elevated."

School Children Hear "Safety First" Arguments

W. Lester O'Brien, superintendent of the Shore Line Electric Railway and the Groton & Stonington Traction Company, operating in Norwich, Conn., recently pleaded with the high school pupils of Stonington to help make "safety first" something more than just a slogan. He told about the efforts being made by railroad, railway, manufacturing companies and cities throughout the country to reduce the number of accidents which carries away a terrible toll in lives every year.

Besides giving the children some human interest stories he gave them several "don'ts" to bear in mind, emphasizing the fact that with reasonable care and good judgment on their parts the possibility of an accident was greatly reduced.

Through Bus Service to Be Started.—The Eastern Wisconsin Electric Company, Sheboygan, Wis., expects to establish through motor bus passenger service between Fond du Lac and Neenah via Oshkosh within the next six weeks.

Evansville Has No Jitneys.—The city ordinance at Evansville, Ind., passed less than a year ago providing that jitneys could not take on or unload passengers on streets where there were electric railway lines, has been rigidly enforced. As a result jitneys have practically gone out of business.

Seeks Permission for Fare Increase.—Application has again been filed by the Madison (Wis.) Railways for permission to make a substantial increase in its fares on its lines in Madison, presumably from its present cash fare of 6 cents to 7 cents or 8 cents. The subject of paving charges will figure prominently when the hearing takes place.

Hearing Scheduled for Bus Charter.—A hearing will be held on May 7 before the Pennsylvania Public Service Commission on the matter of granting a charter for the Logan Valley Bus Company, a subsidiary of the Altoona & Logan Valley Electric Railway, Altoona, Pa. It is the plan of the railway to operate two buses into the Pleasant Valley district, south of Altoona.

Wants to Operate Larger Buses.—The Philadelphia (Pa.) Rapid Transit Company wants the law changed as to size and maximum weight of trucks so that it can run larger buses on Roosevelt Boulevard than now possible under the Pennsylvania ruling. The plans of the company to enter the bus business through a subsidiary have been referred to previously in the ELECTRIC RAILWAY JOURNAL.

Bus Ordinance Passed.—Fremont, Ohio, city officials were in Sandusky on March 30, in conference with Lake Shore Electric Railway officials, seeking a signed agreement that the company will pay a share of the cost of the East State Street paving. The company had intimated that it would pay its share of the paving if the Council would pass a bus license ordinance. The ordinance was passed March 29.

Berkeley Joins in Half Fare Fight.—Berkeley, Calif., has joined in the fight started by Oakland to obtain half fares for school children in those cities on the lines of the San Francisco-Oakland Terminal Railways. City Attorney Gray of Oakland charged undue discrimination on the part of the railway company. He declared that while half fares were in effect in Richmond and Alameda the other cities could not obtain a similar privilege.

Council Suggests Conference on Ticket Sale.—The aldermanic committee appointed to devise means of bringing about a lower rate of fare on the lines on the New York State Railways in Rochester, N. Y., has passed a resolution authorizing negotiations to put certain changes in effect. The plan includes the suggested use of a pass and the sale of sixteen full fare tickets for $1 or in one-half multiples. The Common Council has authorized Commissioner Barnes to negotiate with officials of the New York State Railways on these changes.

Bus Line for Section in Moline.—A bus line operated by either gasoline or electricity is to be established by the Tri-City Railway to provide transportation for residents in the southeast section of Moline, Ill. The bus plan is a counter proposition advanced by Mr. T. C. Roderick, Illinois manager of the traction company, in meeting demands for the extension of the Fourth Avenue line. To make this extension, Mr. Roderick said, would entail an expenditure of approximately $18,000, which is more than half the net earnings of the company last year.

Car Routes Renamed with Historic Significance. — Within the last few weeks several of the routes of the Memphis (Tenn.) Street Railway have been renamed. New signs have been put on the cars showing not only the street or route, but also numbers on ends and sides to indicate the final destination of cars. The Jackson Mound car, for instance, is now called after the changed name of the park where it terminates De Soto Park, which of course is after Hernado De Soto discoverer of the Mississippi River and the first white man to land on the Chickasaw Bluffs.

Identification Card System Awaits Approval.—The City Council of Davenport, Iowa, has taken no action on the petition presented by 2,500 signers for the introduction of the identification card system by the Tri-City Railway & Light Company. The matter is now before the transportation committee. In accordance with the city ordinance, it well be necessary to notify the company in writing thirty days before the system is to be put into effect. The measure as introduced provides for a 5-cent fare for holders of a monthly identification card and allows others to buy four tokens for 35 cents. The flat rate of fare will be 10 cents.

Excursions Being Planned.—The Indiana Service Corporation, Fort Wayne, Ind., will run an unusually large number of excursions this summer, according to an announcement made by J. A. Greenland, general passenger and freight agent of the company. Instead of the usual four excursions a summer to Niagara Falls, the company will run an excursion on Tuesday of each week, starting June 5, with the last one on Sept. 11. The trip will be made to Toledo by traction and from there to Buffalo by boat. The cost of the trip this year with a fifteen-day stopover will be $12.25 round trip from Fort Wayne. A traction trip to Toronto can be added by excursionists at an additional cost of $3.28 for the round trip. Week-end excursions will also be run to Toledo and Lakeview, Ohio. Other excursions will be run to Detroit with a boat trip from Toledo to Detroit.

Personal Items

New Vice-Presidents in New Jersey

John L. O'Toole and Dudley Farrand Advanced—Reallocation of Duties Approved—New General Solicitor

John L. O'Toole and Dudley Farrand have been elected vice-presidents of the Public Service Corporation of New Jersey. The election of Messrs O'Toole and Farrand was announced along with other important changes in the staff of officers of the Public Service Corporation of New Jersey, Newark, and twelve of its subsidiaries, including the Public Service Gas, Electric, Railway and Production companies, made on April 18 at the annual meeting of the directors of the organizations.

Thomas N. McCarter was re-elected president of the corporation and subsidiaries for the twenty-first consecutive term. The board of directors was cut from eighteen to fifteen members. Two vice-presidents resigned and two new ones were named. There was a reorganization of departments, which meant a reallocation of duties for the four vice-presidents that now share equal distinction on the staff of the Public Service companies. A new general solicitor was named.

The vice-presidents who resigned are Randell Morgan of Philadelphia and Colonel Anthony R. Kuser of Bernardsville, both of whom have been in an official capacity with the Public Service family for fifteen years or more. They will continue as members of the board of directors of the corporation and as members of the executive committee. As noted previously the new vice-presidents are John L. O'Toole and Dudley Farrand.

Under the reorganization plan, the vice-presidents and the titles they assumed are: Percy S. Young, vice-president in charge of finance; Edmund W. Wakelee, vice-president in charge of law; Dudley Farrand, vice-president in charge of industrial relations; John L. O'Toole, vice-president in charge of public relations. Mr. Wakelee, who has been general solicitor as well as a vice-president, has relinquished the first title to George H. Blake, who has been assistant general solicitor.

The board of directors was cut so as not to make it necessary to fill three vacancies that have existed since the three members either died or resigned. Another resignation, that of Samuel T. Bodine of Philadelphia, was accepted. Mr. Bodine is president of the United Gas Improvement Company of Philadelphia. He explained that pressure of business made him give up his directorship. Former Circuit Court Judge William H. Speer of Jersey City, general attorney for the corporation, was elected to succeed Mr. Bodine.

The new officers were elected to their positions with the corporation first and at later meetings of the directors of the subsidiaries the same scheme was carried out. All of the men who have been advanced have been in the service of the company for many years. Mr. Speer, the new director, joined the staff in September. Mr. Blake, the new general solicitor, is a comparatively young man, but has been with the corporation some time, having represented it in Hudson County for many years before assuming the work of assistant solicitor in 1921.

Under the reallocation of duties, Mr. Wakelee will relinquish some of his work as vice-president in charge of public relations to Mr. O'Toole, who will now have that title. Mr. Wakelee will devote his entire time to the law. Mr. Young, as heretofore, will be chief financial officer of the corporation.

The scope of the work of Mr. Farrand as vice-president in charge of industrial relations is wide and is not easily definable at this time. He will keep in close touch with the employees of the various subsidiaries and will deal with operating problems. Mr. O'Toole's work will be along the same lines as it has been, together with additional duties to be taken over from Mr. Wakelee.

Messrs. Farrand and O'Toole have previously been known as assistants to the president.

Mr. O'Toole went with the Public Service on Jan. 4, 1909, after having been in newspaper work in Newark for seventeen years. He first was with the *Newark Times* in 1892. The following year he joined the staff of the *Evening News*. For nine years prior to resigning to go with the Public Service as publicity agent, he was city editor of the *News*. In 1917 his title was changed from publicity agent to assistant to the president.

Mr. Farrand has been with the predecessors of the Public Service Electric Company and with the corporation continuously since 1887. He was first elected a director and assistant treasurer of the old Newark Electric Light & Power Company. In 1895 he became assistant general manager of the People's Light & Power Company and in 1898 its general manager. The following year he became general manager of the United Electric Company of New Jersey and in 1903 was made general manager of the electric department of the Public Service Corporation. That was at the time of the reorganization of the corporation. In 1910, Mr. Farrand was made general manager of the Public Service Electric Company and five years later was made its vice-president and general manager. He became an assistant to the president along with Mr. O'Toole in 1917. Mr. Farrand was president of the National Electric Light Association in 1907 and the following year was appointed by President Roosevelt as technical adviser representing the electric interests to the National Conservation Commission. He is a fellow of the American Institute of Electrical Engineers and a member of the American Society of Mechanical Engineers.

Mr. Wakelee joined the Public Service organization in 1913, as associate general solicitor, after having been actively engaged in Republican politics. His home is in Bergen County. He had served in the House of Assembly three terms, being Republican leader in 1900, and then he went to the Senate for three terms, being floor leader and later president of the Senate. In 1904 he was act-



J. L. O'Toole



Dudley Farrand



E. W. Wakelee



P. S. Young

ing Governor for a short period. In 1917 he was made a director and vice-president of the Public Service and in 1921, upon the death of L. D. Howard Gilmour, was made general solicitor.

Mr. Young has been engaged in the gas business in one capacity or another for thirty-three years in this country. He was a native of England. From 1890 to 1898 he was with the Omaha Gas Company. In 1898 he went with the United Gas Improvement Company of Philadelphia and in 1899 with the Hudson County Gas Company as secretary and treasurer. When that company became part of the Public Service Gas Company Mr. Young was made controller of the amalgamated concern. He became treasurer in 1914 and in 1916 was made vice-president of the Public Service Gas, Electric and Railway companies. The following year he became a director in the corporation and vice-president.

One feature of the reorganization is that the four vice-presidents were advanced together in 1917, the first two named being made assistants to the president at that time, and the latter two vice-presidents.

Mr. Danforth Heads Power Company

Richard E. Danforth, vice-president and general manager of the Public Service Railway, Newark, N. J., has been elected president of the Public Service Electric Power Company. Mr. Danforth's election as head of the new electric company does not in any way affect his connection with the railway. The Public Service Electric Power Company will forthwith construct a modern steam electric power plant near Newark, N. J., with an initial installed capacity of 200,000 hp. The company has arranged to acquire sufficient land to care for an ultimate capacity of 400,000 hp. The output will be distributed to the larger cities and the most important industrial centers of northern New Jersey by the Public Service Electric Company. Other officers of the Public Service Electric Power Company are: Henry D. Whitcomb, vice-president; William H. Feller, secretary; Frederick A. Neis, treasurer.

Mr. Taylor Made General Manager at Atlanta

The Georgia Railway & Power Company, Atlanta, Ga., announces the appointment of W. H. Taylor, vice-president, as general manager of the business of the company. He will be designated as vice-president and general manager and will have general supervision over various departments of the company, assisting H. M. Atkinson, chairman of the board, and P. S. Arkwright, president. Mr. Taylor was for seven years president of the Omaha Gas Company of Omaha, Neb. Previous to joining the Georgia Railway & Power Company he was connected with the United Gas Improvement Company in Philadelphia.

Mr. Hood Honored

Vice-President and General Manager of Massachusetts Northeastern Lines Heads New England Club

Ralph D. Hood, president of the New England Street Railway Club for the year 1923-1924, is a native of Massachusetts. He was educated in the public school and at Phillips-Andover Academy and is an engineer by profession. He served as rodman in the Haverhill City Engineer's office in 1891. Next he became transit man for the Haverhill & Amesbury Street Railway, serving that company in 1892 and 1893. He was engineer for the Haverhill, Georgetown & Danvers Street Railway in 1894-1895 and then in turn served in a similar capacity with the Exeter Street Railway, 1897; Exeter, Hampton & Amesbury, 1899-1900; Massachusetts Construction Company and Lowell System, 1900-1903; Manchester & Haverhill Street Railway, 1904. In 1905 he was office engineer for the El Paso &



R. D. Hood

Durango Railroad and in 1906 engineer of the Rockingham racetrack. He was with the Manchester & Derry Street Railway in 1907 and the Dover, Somersworth & Rochester Street Railway and allied companies from 1908 to 1911. On Jan. 1, 1911, Mr. Hood became superintendent of highways for the city of Haverhill and on Jan. 1, 1912, was elected a member of the Municipal Council of Haverhill and served as head of Department of Streets in 1913. He became engineer of maintenance of way of the Massachusetts Northeastern Street Railway and allied companies in 1914, continuing as such to 1917, when he was made vice-president and general manager of these companies.

In addition to his public service in 1911-1913, he has been chairman of the Haverhill Board of Survey from 1917 to date. He saw military service as an officer in the National and State Guards from 1904 to 1919, being promoted successively from Second Lieutenant to Major.

Socially, he is a past president of the Haverhill Rotary Club, a member of the Boston Society of Civil Engineers, American Electric Railway Association, junior warden of the Trinity Church, Haverhill, Mass., and a member of the Massachusetts Consistory.

J. C. Hurd has succeeded R. L. Hughes as superintendent of the Ashtabula & Lake Shore Railway, Ashtabula, Ohio.

A. L. Rider has succeeded T. Nolan as chief engineer of the Toledo, Ottawa Beach & Northern Railway, Toledo, Ohio.

O. A. Taylor has succeeded E. N. Smith as auditor of the Cleveland, Alliance & Mahoning Valley Railroad, at Ravenna, Ohio.

A. Baltzer has replaced J. Carnegie as master mechanic of the Windsor, Essex & Lake Shore Rapid Railway, Kingsville, Ont.

William H. Stamm has been made chief engineer of the Webster, Monessen, Belle Vernon & Fayette City Street Railway, Charleroi, Pa.

Lewis A. McArthur, general manager of the Pacific Power & Light Company, Astoria, Ore., has in addition, taken on the duties of vice-president.

E. E. Doe has succeeded L. E. Kromstrome as claim and general freight and passenger agent of the Levis County Railway, Levis, Que.

J. M. Beauchamp has replaced D. B. Carson as vice-president of the Community Traction Company, Toledo, Ohio. Mr. Beauchamp is located in New York.

W. T. Leander has succeeded W. H. P. Weston as secretary and treasurer of the Lake Superior District Power Company, Ashland, Wis. Mr. Leander is in the Chicago office.

M. W. Kirkwood, general manager of the Lake Erie & Northern Railway, Galt, Ont., has taken on the duties of purchasing agent in addition to those of general manager.

J. P. Moore has been added as one of the commissioners of the London & Port Stanley Railway, London, Ont. The other commissioners are Philip Pocock and F. E. Harley.

Ross Lessig has been made an engineer at the power station of the Wilkes-Barre & Hazleton Railway, Hazleton, Pa. Working in the same capacity with Mr. Lessig is Harry W. Kuhns and Lew Welliver.

C. F. M. Niles has succeeded L. S. Sneath as president of the Tiffin & Fostoria Railway successor to the Tiffin, Fostoria & Eastern Electric Railway. Mr. Niles is located at Toledo, Ohio. He was formerly treasurer of the company.

D. M. Shafer, auditor of the Abilene (Tex.) Traction Company, has also taken on the duties of secretary and treasurer. E. A. Short has succeeded T. S. Jordan as purchasing agent, and N. C. Browning has succeeded C. J. Neese as master mechanic.

R. A. Bruce has succeeded F. J. L. Doyle as assistant secretary and assistant treasurer of the West Virginia Utilities Company, and as auditor and assistant treasurer of the Wheeling Public Service Company, both in Wheeling, W. Va.

M. D. Baer, for several years soliciting freight agent for the Bamberger Electric Railway, Salt Lake City, Utah, has been appointed general freight and passenger agent for that company. Mr. Baer has been with the company in the traffic department since June, 1918.

Matthew C. Brush, well known to electric railway men as the former head of the Boston (Mass.) Elevated Railway, has resigned as president of the G. Amsink Company, but will continue as chairman of the board. He will be succeeded as president by Harry A. Arthur. The Amsink Company is a subsidiary of the American International Corporation.

Dr. Edward P. Hyde, who organized the Nela Research Laboratories in 1908, and who for the past few years has occupied the position of director of research of the National Lamp Works of the General Electric Company, has tendered his resignation to take effect on June 30 of this year. Dr. Hyde, has decided to take a prolonged rest abroad.

Calvert Townley, assistant to president of the Westinghouse Electric & Manufacturing Company, has been reelected a vice-president of the American Engineering Council and has been appointed a member of its finance and public affairs committees. He has also been made a delegate of the American Electric Railway Association to the annual meeting of the United States Chamber of Commerce.

Yanata Yanaaka, managing director of the Osaka Railways, Japan, is on a visit to the United States in connection with the affairs of his company. The electric railways under Mr. Yanaaka's direction consist of about 50 miles of interurban lines. His company is, however, now interested in the electrification of the steam railroads to tie its system into an electrical network. He says that the development of railway electrification is progressing very satisfactorily in Japan. Mr. Yanaaka recently inspected the works of the Westinghouse Electric & Manufacturing Company at East Pittsburgh, studying especially the manufacture of electric railway equipment.

Park W. T. Loy, who for several years has been in charge of the claim work and the marketing of the securities of the Potomac Public Service Company, Hagerstown, Md., has been made head of a recently created general welfare department. In this capacity he will be engaged in the handling of the welfare and relief work over the entire property of the company, which will include health and promotion of employees, accident prevention, first aid instructions, proper relations with employees and certain public relations. His duties will be closely allied with the work of the general manager's office in Wheeling. There, he will be the general manager's personal and general representative in many problems which will come up for discussion. R. Paul Smith, general manager, in announcing the formation of this department, said that the rapid expansion of the Potomac Public Service Company and its subsidiaries, was the reason that led the management to decide upon the creation of a general welfare department.

Obituary

Thomas E. Crossman

Thomas E. Crossman, who served the American Electric Railway Association and its predecessors as official stenographer for forty years, died suddenly on April 4 in the Congress Hotel, Chicago, where he had gone to report the meeting of the American Railway Engineering Association. Mr. Crossman was one of the foremost convention reporters in America. He was a street railway man in the days of the old horse car and the early days of the electric railway and through that connection and his affiliation with the railway association had a very wide acquaintance among electric railway men. He was almost equally well known to steam railroad men through his long association with the work of reporting the proceedings of the American Railway Engineering Association and other steam railroad bodies and also with the operating officials of the electric light and power companies through thirty-three years of reporting the sessions of the National Electric Light Association.



Underwood & Underwood Photo

T. E. Crossman

Mr. Crossman was an indefatigable worker. His profession, however, made extraordinary demands upon his physical and mental powers. Tom Crossman thought about himself last when he thought about himself at all, and so it was that he virtually died doing the work that so many varied interests had come to intrust to his care, knowing that the record which he made would be complete and that the rough edges of extemporaneous speech would all be smoothed down as only the adept at reporting knows how to do it.

As has been indicated previously, Mr. Crossman began his business career with the Atlantic Avenue Railroad, of which company W. J. Richardson, the first secretary of the American Electric Railway Association, was the secretary. Through this connection he undertook the work of reporting the first regular meeting of the association in 1883 at the Fifth Avenue Hotel, New York, and continued to report the later meetings.

At the meeting of the American Electric Railway Association in Chicago last October Chairman George H. Harries, who presided at the sessions on Past-Presidents' Day, called Mr. Crossman before the members and presented to him, in behalf of the association, a gold watch fob stamped with the emblem of the association. In expressing his thanks for the gift Mr. Crossman said that the work of reporting the conventions had never been a grind to him, but was fascinating to him. The truth of the matter really was that the fascination of the work dulled him to the sense of fatigue which necessarily is part of such strenuous endeavors. If this were not true Mr. Crossman would have been more greatly concerned for his own welfare and it is not likely that he would literally have died in harness. A shrewd observer of men writing in the department "Conventionalities" in the daily edition of the ELECTRIC RAILWAY JOURNAL at Chicago last fall paid Mr. Crossman a well-deserved compliment by saying at the time that "Mr. Crossman knows more about this business than do many railway men." Mr. Crossman was sixty years of age.

Arthur B. Burtis, president and general manager of the Mamolith Carbon Paint Company, Cincinnati, manufacturers of railway paints, died recently at his home in that city. Mr. Burtis, who was seventy-five years old, went to Cincinnati from Oaks Corner, N. Y., about twenty-five years ago, to engage in the paint business. Later he became president of the Mamolith company.

Jesse Rankin Wharton, manager of the Butte (Ia.) Electric Railway since 1892, died on March 19, at the age of sixty-six. He was also a director in the company. Mr. Wharton was prominently connected with all activities in Butte, being known as the Grand Old Man of Butte. In his management of the railway he had tried to bring about the greatest amount of efficiency and service.

W. S. MacFarland, assistant treasurer of the Lackawanna & Wyoming Valley Railroad, Scranton, Pa., died very suddenly in his office in Scranton, on April 14. He was born in 1870 in New York City and before entering the railroad field was connected with several industrial concerns. In 1918 he joined the forces of Ford, Bacon & Davis in New York and remained there for three years doing auditing and other accounting work. Mr. MacFarland next served in turn with the Empire State Railroad and the Central New York Southern Railroad, at Ithaca, N. Y., both of which are under the management direction of Ford, Bacon & Davis. He remained at Ithaca a very short time, and since leaving there has been associated with the Lackawanna & Wyoming Valley Railroad at Scranton.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

Air Brake Representatives Promoted

The Westinghouse Air Brake Company has announced a number of new appointments and promotions in the personnel of its organization.

V. Villette, mechanical expert, Pacific district, Westinghouse Air Brake Company, has been promoted to representative, Westinghouse Air Brake Company and Westinghouse Traction Brake Company, same district.

A. C. Layton, a locomotive engineer on the Los Angeles Division of the Southern Pacific, succeeds Mr. Villette as mechanical expert.

Raymond Boiselle, mechanical expert, Westinghouse Traction Brake Company, St. Louis, has been transferred to Wilmerding as representative, Westinghouse Air Brake Company and Westinghouse Traction Brake Company, Pittsburgh district.

F. C. Young, industrial representative, Pittsburgh district, has been promoted to representative, Westinghouse Air Brake Company and Westinghouse Traction Brake Company, same district.

S. B. Schrontz, chief clerk, Pittsburgh district office, has been appointed industrial representative, Pittsburgh district, assisting Mr. Young.

E. H. Weaver, industrial representative, Pittsburgh district, has been transferred to the Chicago office as inspector for the Westinghouse Air Brake Company.

New Turbine for Pennsylvania Railroad Electrification

The Pennsylvania Railroad has recently purchased from the Westinghouse Electric & Manufacturing Company a 20,000-kva. turbine generator, complete with condensers, auxiliaries and switching equipment. This unit will be installed in the Long Island City power plant, which supplies power to the Pennsylvania tunnel and terminal electrification at New York City. This is the fourth Westinghouse unit of this capacity that the railroad has purchased for this power house. When the new unit has been installed, the station will contain four 20,000-kva. turbines and one of the original 8,000 kva. units. It is the intention of the railroad eventually to replace the last named with another 20,000-kva. machine, making the final capacity of the station 100,000 kva.

Each of the four 20,000-kva. installations consist of one high-pressure condensing steam turbine generator, producing 11,000-volt power at 25 cycles. This rating is with three-phase operation, the corresponding single-phase capacity being 13,000 kva. There is also one 32,000-sq.ft. surface condenser, one direct-turbine-driven Le Blanc air pump, one motor-driven condensate pump, one turbine-and-gear-driven circulating water pump and the necessary switch equipment.

Westinghouse to Sell Additional Common Stock

The Westinghouse Electric & Manufacturing Company will offer $14,962,530 additional common stock at 53 to preferred and common stockholders of record April 16, in ratio of 20 per cent of holdings. The net profits of the company available for dividends, for the fiscal year ended March 31 (March estimated), will amount to about $12,000,000; while dividends on the shares, including new issue of stock, at rate now being paid, 8 per cent per annum, will be $7,182,000.

The directors of the company believe there will be a still further enlargement in demand for the company's products, due to public attention now being directed toward hydro-electric developments, steam railroad electrification, industrial electric manufacturing processes, further development of activities in the radio field, and a widening use of electricity for other purposes. The board of directors has no present plans for substantial enlargement of plants, but it has deemed it advisable to increase working capital by making this offering of additional common stock. It is explained that if expectations as to continuance of prosperous business conditions should not be realized, the additional issue of stock will place the company in a favorable position to redeem its 7 per cent bonds, due 1931, which become callable as a whole on or after May 1, 1926. The Westinghouse Company has $121,000,000 common stock of $50 par authorized, of which $70,813,950 is outstanding. There is $3,998,700 of 7 per cent cumulative preferred stock outstanding of $4,000,000 authorized.

Net Income Increases

The report of the International General Electric Company, Inc., for the year ended Dec. 31, 1922, shows net income of $2,265,477, after expenses, interest and taxes, equivalent, after preferred dividends, to $15.65 a share earned on $10,000,000 common stock. This compares with $1,973,072, or $12.73 a share, in 1921. The surplus in 1922 after preferred dividends amounted to $1,565,477 against $1,273,073 in 1921.

American Company Gets Part of Glasgow Contract

At a meeting of the Glasgow Town Council on March 29 there was much discussion on a proposal by the tramways committee that an order for about £4,000 worth of special trackwork should be divided among four firms that had submitted tenders. One of the four was the United States Steel Products Company and its tender was the lowest. The other tenders were from British firms. One town councillor moved that the contract should be awarded to the three British firms. He based his suggestion on the assertion that in the works of the American company the employees were not allowed to be members of a trade union. In purchasing steel from America, Britain was not only getting steel but the blood of the working class. On behalf of the tramways committee it was explained that it would have accepted the lowest offer (the American), but on the ground of unemployment in Britain the members of the committee thought it would be hard on British labor to send the order to America. The committee, however, could not afford to cut out the American offer altogether because it had had large quantities of steel rails from American mills, when British prices had been prohibitive.

Another amendment was moved to accept the lowest offer on the ground that if Britain ceased importing goods its shipping industry would be ruined. Mr. McWhirr, chairman of the tramways committee, said he was satisfied that the workers of the American company were employed under conditions that compared very favorably with those of the workers similarly engaged in Britain. A great part of the Glasgow tramway system was equipped with rails supplied by the United States Steel Products Company and there was conclusive evidence of the value of the work turned out.

The proposal to accept the American tender for all the work received only eighteen votes and was dropped. On a vote between the acceptance of the three British offers and the committee's proposal dividing the work between the four firms the latter was carried by forty votes to thirty-two.

Metal, Coal and Material Prices

	April 17, 1923
Metals—New York	
Copper, electrolytic, cents per lb	16.875
Copper wire base, cents per lb	19.625
Lead, cents per lb	8.20
Zinc, cents per lb	7.60
Tin, Straits, cents per lb	45.25
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	6.30
Somerset mine run, Boston, net tons	3.375
Pittsburgh mine run, Pittsburgh, net tons	2.00
Franklin, Ill., screenings, Chicago, net tons	1.95
Central, Ill., screenings, Chicago, net tons	1.575
Kansas screenings, Kansas City, net tons	2.625
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft	7.75
Weatherproof wire base, N. Y., cents per lb.	19.50
Cement, Chicago net prices, without bags	$2.20
Linseed oil (5-bbl. lots), N. Y., per gal	$1.195
White lead, (100-lb. keg), N.Y., cents per lb.	13.375
Turpentine, (bbl. lots), N.Y., per gal	$1.56

Rolling Stock

Eastern Wisconsin Electric Company, Sheboygan, Wis., expects to purchase five new sedan buses which it is planned to have in operation before June 1.

Warren-Jamestown Street Railway, Warren, Pa., has placed an order with the Kuhlman Car Company for four interurban cars of the latest and most approved design to be delivered in Warren in about four months. The length of the cars will be 45 ft. over all. They will have a seating capacity for approximately fifty passengers.

Ohio Valley Electric Railway, Huntington, W. Va., has purchased forty new steel cars at an estimated cost of $500,000. The cars are being built by the J. G. Brill Company, Philadelphia. They were designed especially for Huntington and are larger, lighter and considerably more comfortable than those now in service. The new equipment is expected to be put in operation some time in August. The cars measure 40 ft. in length over all and will seat forty-eight persons. They are of all steel construction and entirely modern in design, made double end as the present cars but arranged for either one-man or two-man operation. The cars complete will weigh about 17 tons, as against 25 to 30 tons, the weight of the largest car now in service. They are to be equipped with four 35-hp. motors and air brakes.

San Diego (Calif.) Electric Railway has ordered from the American Car Company of St. Louis, fifty cars to be delivered in September. They will cost $18,500 each, or a total investment in new equipment of nearly $1,000,000. These cars are of the latest type, convertible for either one-man or two-man operation. They are double-truck motor cars, with straight sides, round ends and arched roofs. Top sash stationary, except four on each side to be pivoted. Seating capacity when operated with one man fifty-five, with two men, fifty-four. Length over all, 47.5 ft. Length over dashes, 46.2 ft. Width over all, 8.6½ ft. The doors at the ends, opening out, will be a new departure in San Diego, as heretofore all the company's large cars have been of the center entrance type, only the small Birney safety cars having the end entrance and exit. The new cars will be equipped with the National Pneumatic Company's electric pneumatic safety interlocking door control. The control is operated by push buttons, with switches for one and two man operation. They are also to be equipped with Tomlinson automatic couplers. These cars will also be placed in the general service on the city lines.

Track and Roadway

San Francisco - Oakland Terminal Railways, Oakland, Calif., has started the reconstruction of tracks for about a mile along Grove Street in Berkeley from Berkeley way to the Alameda. The cost will approximate $100,000.

Hydro-Electric Power Commission, Ontario, Canada will spend $150,000 on rebuilding radial roadbed on Lake Shore Road, New Toronto, Can.

Madison (Wis.) Railways has announced the 1923 budget for expenditures. It includes an authorized expenditure of $40,000 to be used for track and line improvement purposes, as well as for additional construction work and other needed improvements.

Cleveland, Ohio.—Traction Commissioner Holcomb recently submitted to the traction committee in behalf of the Cleveland Railway a proposed program of improvements to cost $869,807. The plans call for removal of worn-out tracks, double tracking and repaving in all sections of Cleveland.

New York State Railways, Utica, N. Y., will spend $150,000 in improvements in Utica. The James Street line will be extended to St. Vincent Street, new tracks will be laid in Genesee and Bleecker Streets and a loop will be built at the entrance to the Yahnundasis Golf Club.

Seattle, Wash.—Repairs to Rainier Avenue costing more than $8,000 are said to have been necessitated by the city street department, owing to the seepage of water between the rails of the Seattle & Rainier Valley Railway. The company's right-of-way, with the exception of Dearborn Street, has never been paved, owing to the financial condition of the company.

Power Houses, Shops and Buildings

Louisville (Ky.) Railway has closed deals whereby it has secured all the property on Second Street, excepting one lot, in the area in which interurban stations will be erected. The company will probably bring condemnation proceedings to get the one building, which is 95 x 95 feet, at the corner of Second and Liberty Streets.

Wisconsin Public Service Company, Green Bay, Wis., during this summer will start work on the development of another large hydro-electric power plant at Caldron Falls site. The plant will cost approximately $750,000 and will be located on the Peshtigo River. The company has just recently completed its Johnson's Falls hydraulic development, which cost approximately $700,000 to erect.

Public Service Corporation of New Jersey expects to start construction soon on a $20,000,000 superpower station. The new station, which will add 200,000 hp. to the system's capacity, will be built on the Kearny Meadows. The power furnished by the addition will be used for industrial and domestic needs of northern New Jersey. Mr. McCarter, president of the Public Service Corporation, has stated that arrangements for financing the enterprise have been completed.

New Incorporation

San Antonio, Medina Lake & Western Railway, San Antonio, Tex., has been incorporated. Its object is to build an electric line from San Antonio to San Angelo. The estimated cost is $190,000. The project will comprise 190 miles of road through new territory.

Trade Notes

Nichols-Lintern Company, Cleveland, Ohio, reports that the demand for N-L car equipment has been very good. Since Jan. 1 orders for N-L indicating signals, sanders and ventilators have been exceptional. A continuance of the demand is expected for several months.

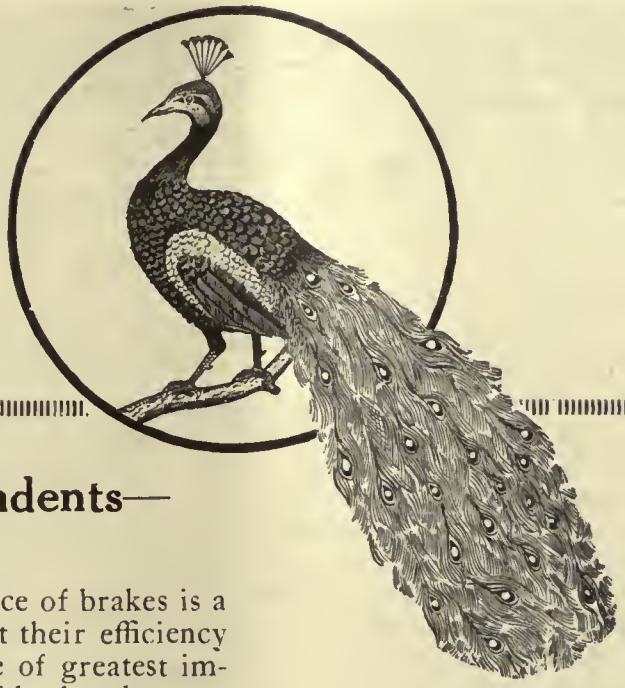
American Insulated Wire & Cable Company, Chicago, is now manufacturing magnet wire, having begun operations on April 1. Its products are sold under the trade name A-1 Magnet Wire and consist of the following: plain enameled; single cotton covered; double cotton covered; single cotton enameled; double cotton enameled; single silk covered; double silk covered; single silk enameled; and double silk enameled.

Combustion Engineering Corporation, Ltd., and the Uehling Instrument Company have recently entered into an agreement whereby Uehling interests in the Dominion of Canada and Newfoundland will be handled exclusively by the Combustion Engineering Corporation, Ltd., with principal offices located in Toronto, Montreal, Winnipeg and Vancouver. The Uehling line includes such fuel economy equipment as CO_2 recorders, SO_2 recorders, draft recorders, combined barometer and vacuum recorders, absolute pressure indicators, etc.

New Advertising Literature

Hisey-Wolf Machine Company, Cincinnati, Ohio, has issued a revised bulletin on portable electric drills and reamers. A reproduction of a sectional drawing shows the construction clearly. Several sizes of drills and reamers are listed, as well as two sizes of drilling stand, or drill press, in which the Hisey drill is incorporated. The bulletin is No. 106; it supersedes Nos. 105-155.

Link Belt Company, Chicago and Philadelphia, has recently issued a comprehensive and instructive book, "Electric Hoists and Overhead Cranes." It is not only profusely illustrated with photographs of actual installations showing some of the most recent Link-Belt electric hoist applications, but with line and wash drawings, the subject of proper installation and efficient operation is fully covered. Going further than the usual "catalog," Book No. 480, as it is known, tells, in print and picture, of the practices and methods employed by users in widely divergent fields.



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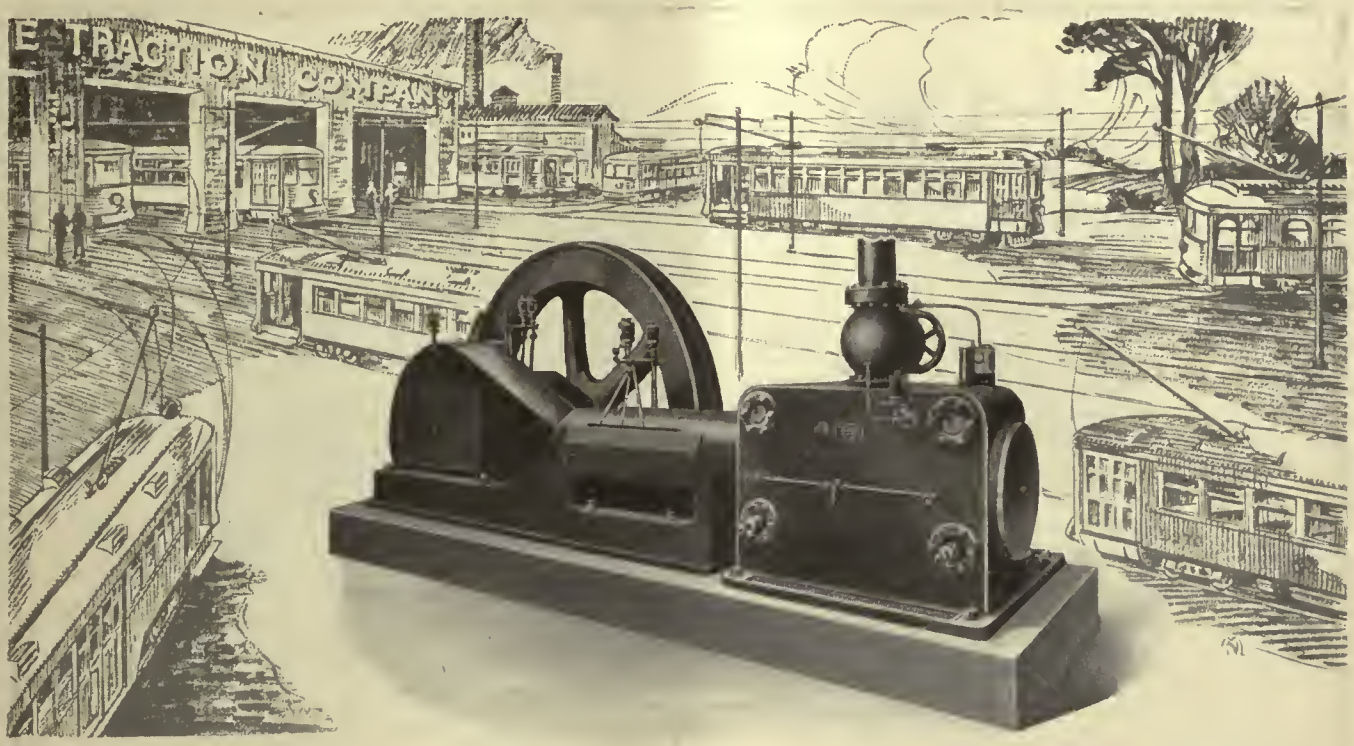
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THE ASSOCIATED BUSINESS PAPERS, Inc.

JESSE H. NEAL, *Executive Secretary*

HEADQUARTERS: 220 WEST 42nd STREET NEW YORK CITY



You Can Increase Your Effective Power

Of all the power developed in your plant, only that which is available for production purposes is effective.

Eighty percent to ninety percent of the energy contained in the coal you burn is wasted—some by heat losses, and a large portion through friction.

The fact that a large percentage of this friction loss is unpreventable merely emphasizes the importance of using Standard Oils and Greases to minimize that part which can be prevented.

For instance: In the cylinder and main bearings, the two major frictional surfaces of a steam engine similar to that illustrated, there is a large friction loss even under ideal running conditions. In the average plant this loss is increased by failure to secure a correct lubricating balance.* Let us say that there is an average friction loss in the above engine operating under the best of conditions of 10%—while under usual conditions this average loss is 20%. The difference of 10% represents what it is possible for you to save when you obtain a lubricating balance.*

Many traction systems are keeping their preventable friction losses to an absolute minimum by the proper use of Standard Lubricants. These oils and greases, made from specially selected crudes, are the result of our experience covering over one-third of a century in refining, manufacturing and recommending lubricants for every conceivable type of mechanism operating under many different and difficult conditions.

You will increase your effective power and thus decrease your production costs, when, as recommended by our lubricating engineers, you use

Standard Oils and Greases

*A LUBRICATING BALANCE — Too thin a lubricant produces solid friction—one which is too thick produces fluid friction. When you use an oil which will prevent the former and minimize the latter you have a lubricating balance.

The Standard Oil Company (Indiana) maintains a corps of lubricating engineers to help you obtain this lubricating balance, so necessary if you would decrease your production costs. They will be glad to recommend the proper Standard Lubricant for every moving part in your plant, or, for one machine or part only.

Our nearest branch office will serve you, or write direct to

STANDARD OIL COMPANY
(INDIANA)

965 S. Michigan Boulevard CHICAGO, ILL.



An 18 in. Diameter "GENUINE OPEN HEARTH IRON" Culvert Pipe in Use on the Weldon-Jackson Highway in Northampton County, North Carolina.

Direct wear of heavy traffic for 6 years leaves no mark on this culvert—it's a NEWPORT

The above illustration shows anything but an ideal installation of culvert pipe. However, it does show what a NEWPORT CULVERT will stand under the most adverse conditions.

Speaking of cheap installations, the laying of this particular culvert did not cost more than 10c a foot, leaving out the consideration of breakage that has to be figured in the final cost, as well as replacements, which have not been made to date.

NEWPORT Culverts of "GENUINE OPEN HEARTH IRON" are without equal in their field.

THE NEWPORT CULVERT CO

GENUINE OPEN HEARTH IRON

NEWPORT CULVERT INC.

NEWPORT 641 W. 10TH ST. KENTUCKY

A Railroad Man's Experience With The Fox Rotary Sweeper

"One of the many problems confronting operating and mechanical forces of street railways is the convertion of snow removal equipment to other uses during the spring, summer and autumn months, instead of allowing it to lie idle as has been the case up to the advent of the Fox Rotary Sweeper. The introduction of this broom, mounted on an automobile chassis, opens up new possibilities in this direction. Speaking from an experience of twenty-two years I would say that the Fox Rotary Sweeper has been a God-send to the operating departments of our street railways."

OUTSTANDING FEATURES

1. *"Flexibility of Operation:* Can be operated on any paved street, and will sweep snow, slush or sleet from rails more thoroughly than the old-fashioned sweeper.
2. *Speed:* It will cover a given distance in one-half the time taken by an electric car sweeper.
3. *Self-contained Motive Power:* Its operation in sleet or hail storms is not affected by power failures as is the case with the electric car sweeper. It will cover territory independently and clear the right of way for the progress of cars.
4. *Maintenance and Operation Cost:* A saving of one man's time is effected in the operation of the Fox Rotary Sweeper over an electric car sweeper. The cost per mile for operating an electric car sweeper averages 74 2/5 cents, while the Fox Rotary Sweeper can be operated for 34½ cents.
5. *General Utility:* The broom attachment of the machine can be removed from the chassis in less than one hour, thus converting it into an emergency truck for towing cars, carrying replacers or equipment for line repairs, etc. The ease with which replacements of rattan are made in the broom of the Fox Rotary Machine is worthy of mention, as compared with the method that has to be employed on the brooms of electric sweepers.
6. *Efficiency:* The Fox Rotary Snow Broom will negotiate any kind of a street railway grade without lessening the thoroughness of its snow removal work. Illustrative of this statement is the fact that when our electric car sweepers failed, the Fox Rotary Sweeper successfully operated and kept the road open."

"From actual experience in snow removal work on a fifty-mile street railway during the winter of 1922-1923, I gladly testify that the results achieved by this machine have far exceeded the claims of the manufacturers for it.

It is an unqualified success."

The above is quoted from a report rendered by a prominent Street Railway official.

FOX ROTARY SNOW BROOM COMPANY

Two Lombardy Street, Newark, N. J.



"AJAX"



The practical electric arc welder —it works under railway conditions

Light in weight and easily moved about—that's the first advantage of the "Ajax" Electric Arc Welder.

Its extreme simplicity is another big point in its favor. It dosen't require a trained welding expert to use it and keep it in working order. With it, any workman of average intelligence can learn to make good welds.

But above all else—its high ampere capacity under *average* trolley voltage enables it to make deep, strong welds under any circumstances. Low voltage results in more welding failures than any other cause, but with the "Ajax" that difficulty is minimized.

Track Grinding Equipment for Every Purpose

"RECIPROCATING"

The machine used by nearly all the leading electric railway companies for removing corrugations. Many companies keep large numbers of Reciprocating Track Grinders constantly at work, with the result that car operation is smoother and more quiet and depreciation is retarded.

"ATLAS"

A light, fast and efficient rail grinder, especially suitable for following up welding operations. Removes surplus metal after welding, and grinds down to a long, smooth approach and run-off at built-up joints. Easily derailed to permit cars to pass.

"UNIVERSAL"

A rotary track grinder for highest grade grinding. Its tilting grinding wheel enables you to do a finished job around special work, in grooves and along gauge lines of rail. Large rubber-tired derail wheels for removing it from the track.

Railway Track-Work Company

3132-48 E. Thompson St., Philadelphia, Pa.

30 Church St., New York

AGENTS:

Chas. N. Wood Co. Boston — Electrical Engineering & Mfg. Co. Pittsburgh — Atlas Railway Supply Co. Chicago — P. W. Wood New Orleans — Equipment & Engineering Co. London



When did you have the last *"Pull In"*?

If you can't remember the last time a car came limping in with a hot box, you're lucky — or wise!

And Brother you may stick a pin in this:

The best form of insurance against hot boxes is

"Good Oiling"

In other words a little care—and just enough Texaco Electric Car Oil.

Our Texaco Lubrication Engineers will be glad to show you how much, or rather how little oil is needed.

The Oils will talk for themselves, but in the meantime let us say this about them:

One of the best proofs of their excellence
is the number of properties who have adopted Texaco Electric Car Oils.

The reasons for the success of Texaco Car Oils on journals, armature bearings and axle bearings are very plain.
They saturate readily and drain properly with various grades of waste.
They give equally good service over the widest range of bearing metals when applied with waste pads or mechanical oilers.
They feed evenly and adequately to the rubbing surfaces. They lubricate thoroughly and prevent glazing of the waste or pads.
Texaco Car Oils show no chemical reactions or separation in use.
They meet the bearing pressures and speeds encountered in the work.

Texaco Electric Car Oils are manufactured in two grades: one for summer, one for winter.

The proper grade, when used in season, will take care of all atmospheric and operating temperatures.

Let us show you on your road how Texaco Car Oils reduce hot boxes, promote lubrication efficiency, save oil, save waste, save labor and reduce maintenance cost.

You will like the way in which we go about things. And soon you will have us co-operating with your men to improve lubrication all along the line.

There is a Texaco Lubricant for Every Purpose

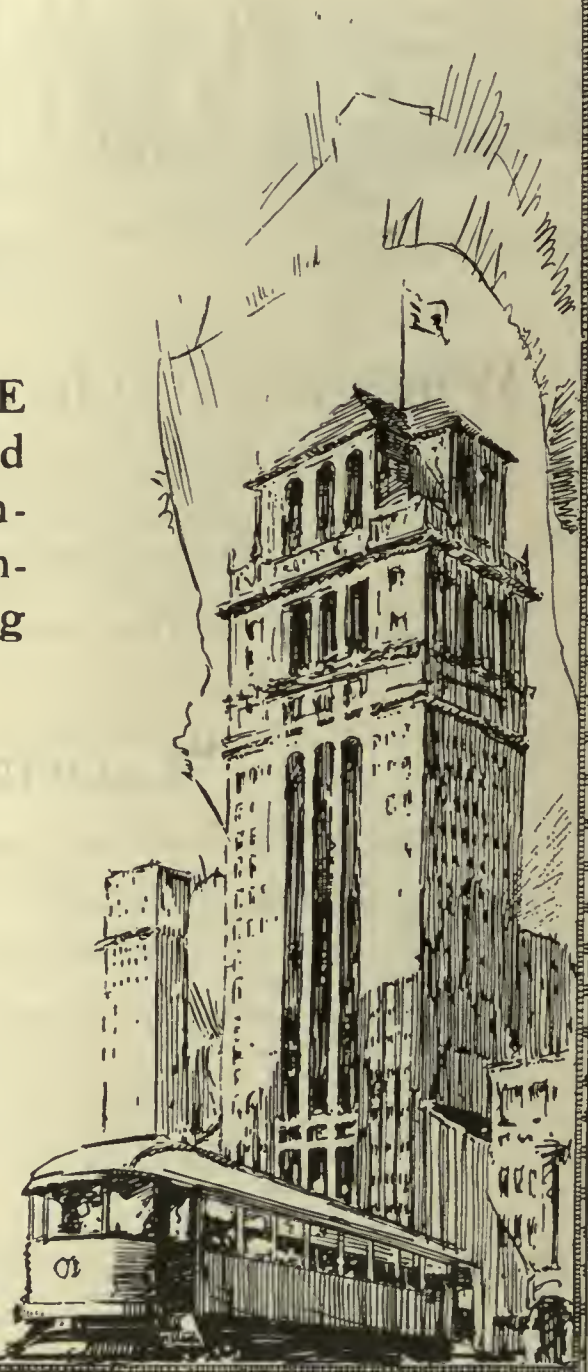
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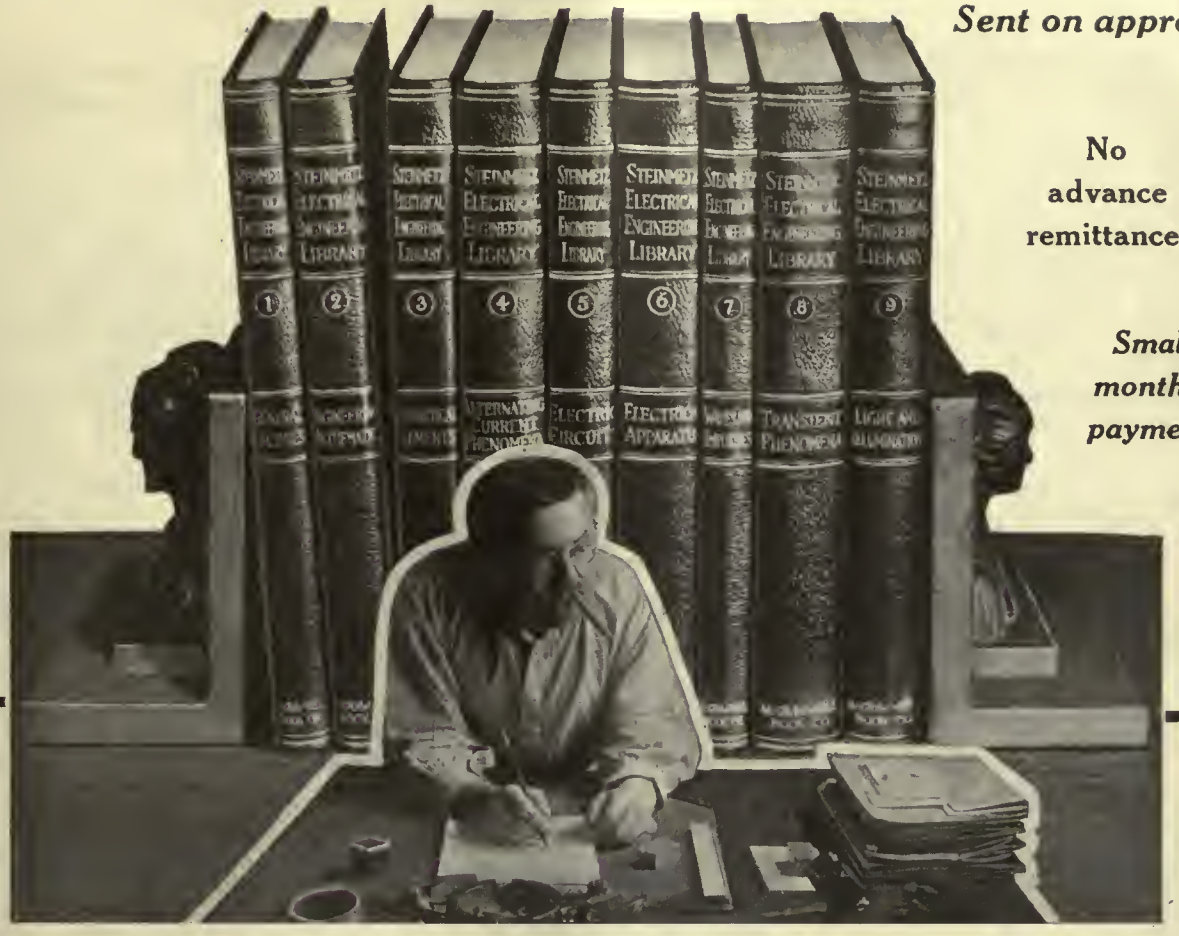
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Try this one on your brake rigging!

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Other BOYERIZED Equipment

Brake Pins
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Bolster and Transom Chafing Plates
McArthur Turnbuckles
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The McArthur Turnbuckle

Lasts longer because the Boyerizing Process puts that remarkable toughness into it, which withstands the wear and tear.

More than that—it's the easiest turnbuckle to adjust, and has the surest grip. The split clamp construction cannot loosen, once the *little* nut on the side has been tightened. And it only takes a handy monkey wrench to set it up—there's no big lock-nut to jam home.

McArthur Turnbuckles make brake rigging adjustments easy.

Bemis Car Truck Company

Electric Railway Supplies

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A late model 4-cylinder Autocar

The sturdy
Autocar
Wherever there's a road

"The Sturdy Autocar" Endorses Edge Moor

THE Autocar Company, pioneer maker of motor trucks, has a 500 H. P. Edge Moor in its big plant at Ardmore, Pa. A recent letter from the Autocar Company says:

"This boiler has been installed for several years, and is giving very satisfactory service.

"We operate with a furnace temperature of 2400° F., a temperature at top of first pass of 950° F., and a stack temperature of 425° F., when carrying 125% of rating at 150 lbs. pressure.

"As the main purpose of a boiler is to absorb the heat from the fuel, you can readily see from the above temperatures that this Edge Moor Boiler is acting in a way to confirm the confidence we had in it at the time we made the purchase."

Edge Moor Water Tube Boilers are designed and built to meet the conditions imposed upon modern power plants.

The Edge Moor catalogue explains the important advantages of this boiler that have won for it the preference of industrial leaders. Your request will bring a copy promptly.

EDGE MOOR IRON COMPANY
Established 1868
EDGE MOOR, DELAWARE
New York Chicago St. Paul Boston Pittsburgh Charlotte



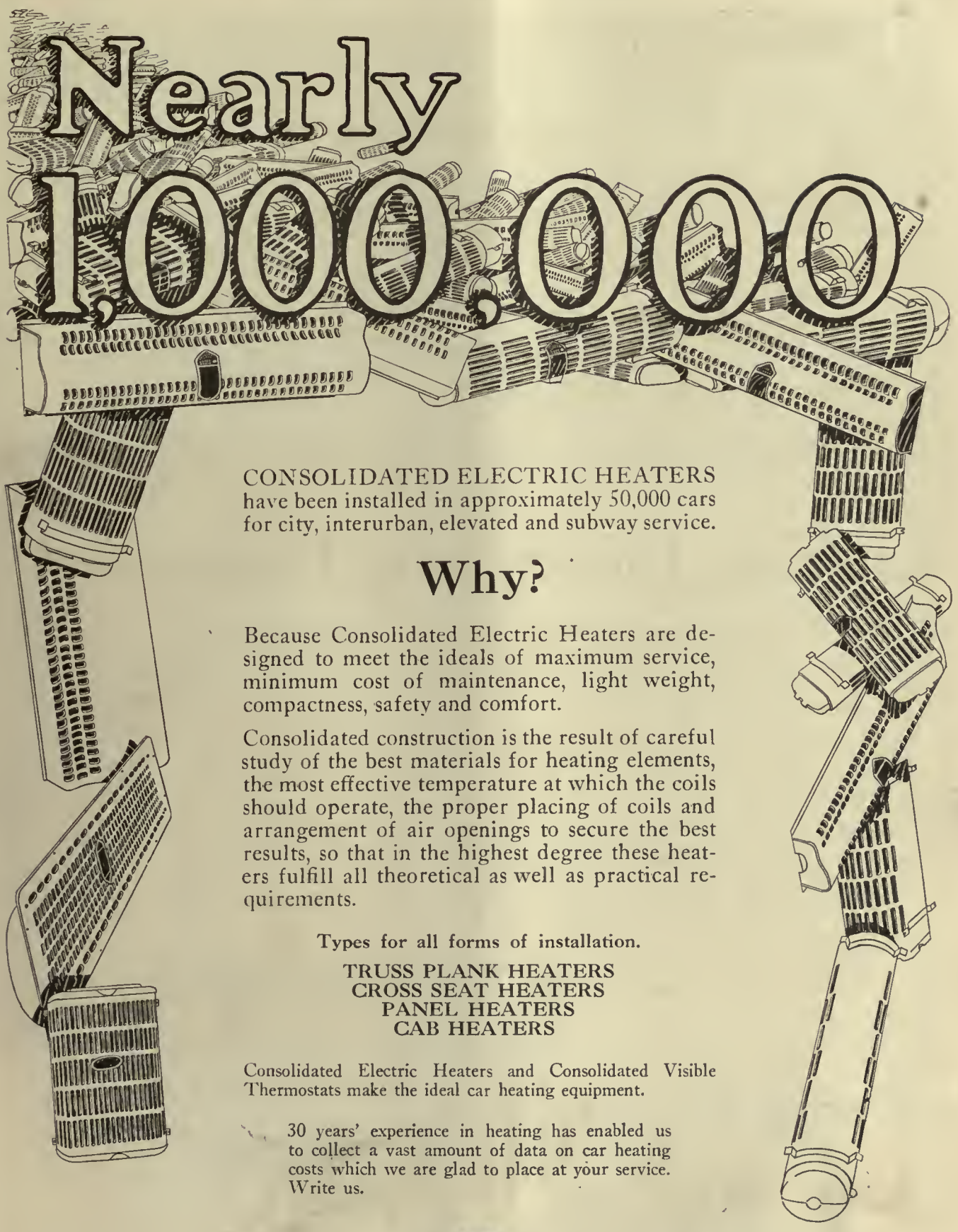
500 H. P. Edge Moor Boiler with Detroit stoker in the Autocar plant at Ardmore.



EDGE MOOR Water Tube BOILERS

FOR INCREASED FUEL ECONOMY

Nearly 100,000



CONSOLIDATED ELECTRIC HEATERS have been installed in approximately 50,000 cars for city, interurban, elevated and subway service.

Why?

Because Consolidated Electric Heaters are designed to meet the ideals of maximum service, minimum cost of maintenance, light weight, compactness, safety and comfort.

Consolidated construction is the result of careful study of the best materials for heating elements, the most effective temperature at which the coils should operate, the proper placing of coils and arrangement of air openings to secure the best results, so that in the highest degree these heaters fulfill all theoretical as well as practical requirements.

Types for all forms of installation.

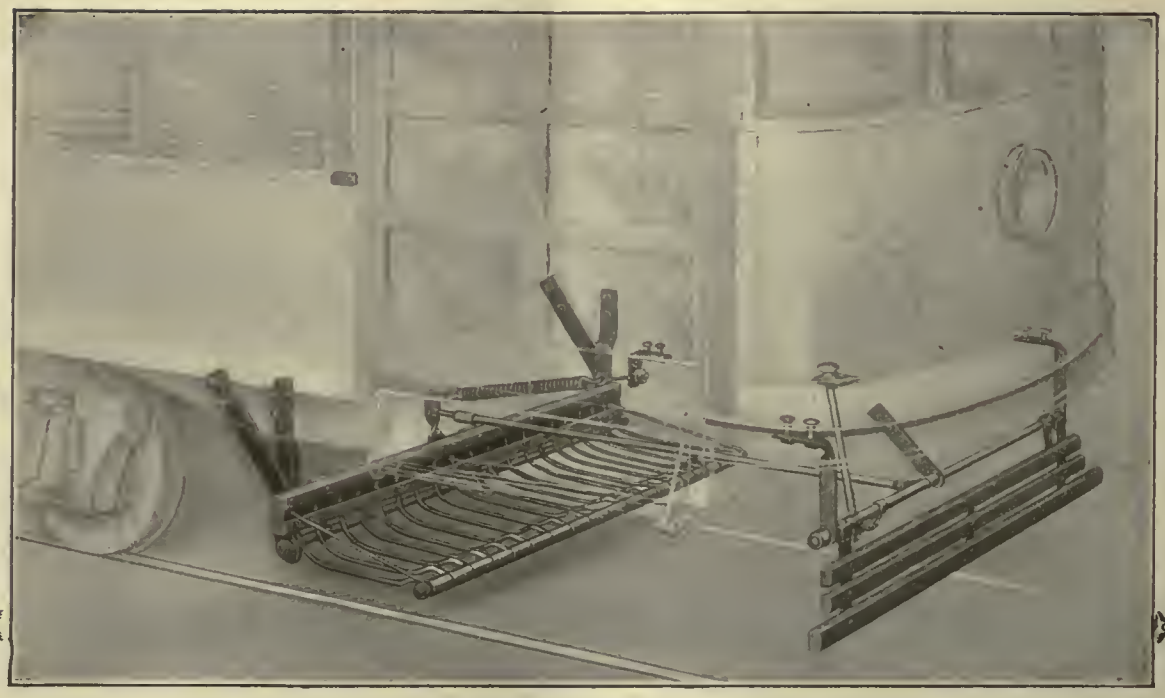
TRUSS PLANK HEATERS
CROSS SEAT HEATERS
PANEL HEATERS
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Consolidated Electric Heaters and Consolidated Visible Thermostats make the ideal car heating equipment.

30 years' experience in heating has enabled us to collect a vast amount of data on car heating costs which we are glad to place at your service. Write us.

CONSOLIDATED CAR-HEATING CO.

New York Albany, N. Y. Chicago



Leading Life-Saving Equipment

Providence Fenders

For many years standard equipment for leading suburban and interurban electric railway lines in America and abroad. An inexpensive and efficient protection against fatal accidents.

H. B. Life Guards

With our latest improved type all-metal basket, H. B. Life Guards for city cars offer adequate protection against accidents with minimum maintenance costs.

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Providence Fenders





H. B. Life Guards

PROTECTION NOARK SERVICE

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VULCANITE

The finest lamp is inefficient in a dusty shade

Even a high power lamp may give poor light if you cover it with a dusty shade. But it is not the fault of the lamp.

Quality fuses, too, cannot afford your circuits the fullest protection —if you mount those fuses in faulty clips or cutout bases.

NOARK Fuses assure users the utmost protection fuse quality can give. But they give still better service when mounted in NOARK Fuse Clips or NOARK Cutout Bases.

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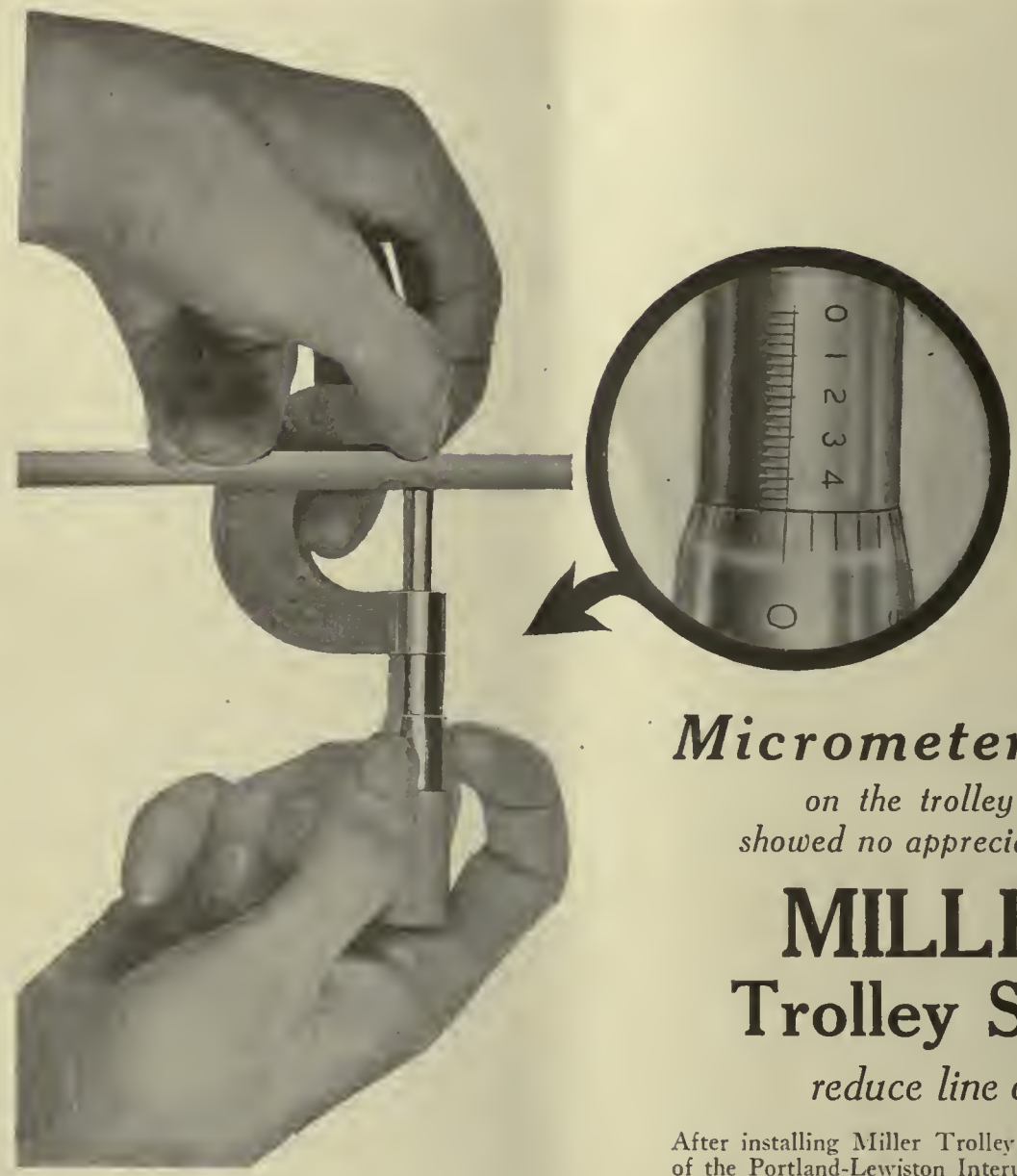
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Micrometer Tests

on the trolley wire
showed no appreciable wear

MILLER
Trolley Shoes

reduce line costs

After installing Miller Trolley Shoes, the officials of the Portland-Lewiston Interurban began a little quiet checking up of wear on their 4/0 trolley. And this is what they found in four months—three places with a wear of less than .001 inch and at all the rest no wear could be noted.

Miller Trolley Shoes actually cut line costs materially. They wear the wire less, if anything, than wheels and do not cause the numerous line breaks that occur when ordinary trolley wheels leave the wire.

Try them for yourself

Miller Trolley Shoe Co.
Boston-21, Mass.

Western Representative: **L. E. GOULD**
1590 Old Colony Bldg., Chicago







On the

W.,B.&A.—

Beckwith-Chandler Paints and Varnishes

It means something when a road like the Washington, Baltimore and Annapolis Electric Railroad Company uses our roof paint, truck black, and inside varnishes. It is also significant that they permit us to use their name and pictures of their painting operations in this connection.

It all means that they have thoroughly tested these products from the point of view of satisfactory service and economy, and find that they meet the requirements.

Beckwith-Chandler Car Finishes are made of highest quality ingredients, properly compounded for the particular service they are to undergo. They are used by many of the largest steam and electric roads in the country, roads on which the character of car finishes is considered of vital importance in making the service attractive to passengers.

Write for further information.

The Beckwith-Chandler Company
203 Emmett St., Newark, N. J.
320 Fifth Ave., New York

BECKWITH CHANDLER CAR FINISHES
SELL TRANSPORTATION



Pull out rope, Remove oil hole plug, Insert oil can spout and fill oil reservoir. Na need to remove the retriever from car ar take opart.

This "Phantom" Picture Shows How It's Done.



Two Big Factors in Efficient and Economical Car Maintenance

The No. 5 Knutson Trolley Retriever and the Simplex No. 3 Trolley Base have been the standards of high speed roads for many years because of their greater efficiency and durability and low maintenance cost.

They are also extensively used in city service for the same reasons.

Our new lubricating feature (see "phantom" view above) still further increases the efficiency and decreases the maintenance cost of the Knutson Retriever.

The Simplex No. 3 Base is the only base with roller bearings in both center and side swivels and *the only base* THAT NEVER NEEDS LUBRICATING.

Write for full information and prices.

THE TROLLEY SUPPLY COMPANY

Specialists for Over 20 Years

Massillon, Ohio



The Only All Steel Base on the Market

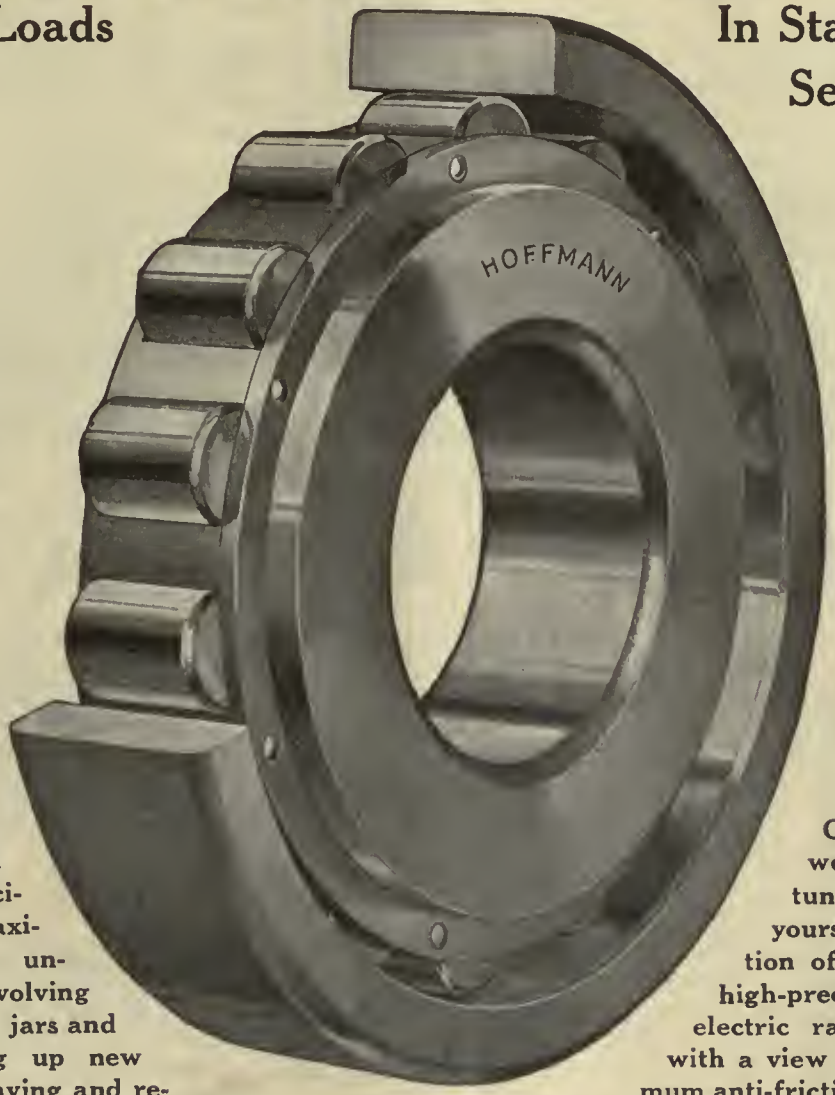
Never Needs Lubricating

HOFFMANN

PRECISION ROLLER BEARINGS

For Heavy Loads and Hard Service

In Standard and Self-Aligning Types



Heavy-duty units built to the highest standards of precision; affording maximum serviceability under conditions involving heavy loads, shocks, jars and vibrations; opening up new avenues to power saving and reduced up-keep costs; built in both standard and self-aligning types.

Our engineers will welcome an opportunity to work with yours, in the application of these high-duty, high-precision bearings to electric railway equipment with a view to securing maximum anti-friction efficiency, minimum maintenance costs, and continuity of service.

THE NORMA COMPANY OF AMERICA

Anable Avenue Long Island City New York

Manufacturers of "NORMA" Precision Ball Bearings

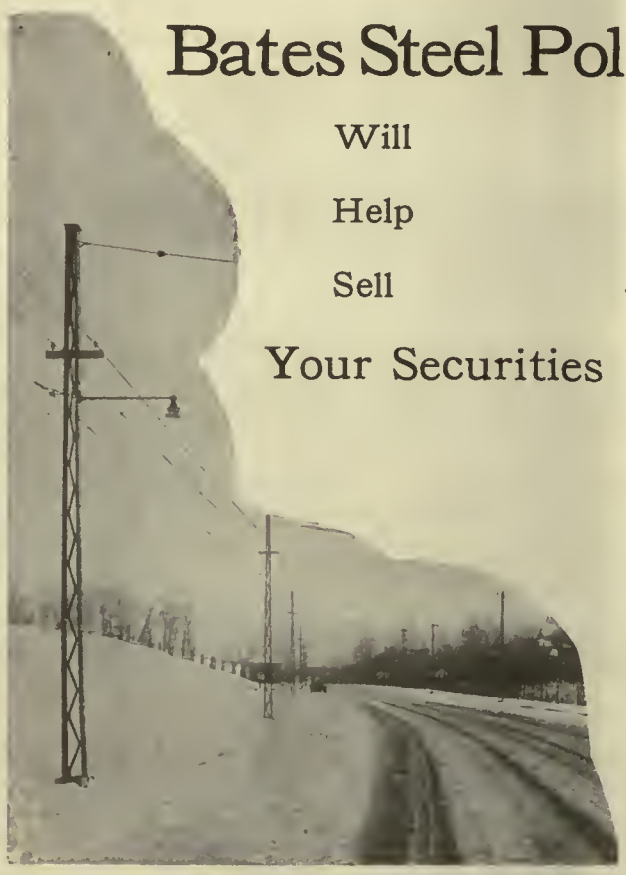
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Help

Sell

Your Securities



Use Bates Steel Poles with your other first-class equipment and the whole installation will be permanent and an inducement for your security buyers.

Bates Pole installations are easily maintained. All surfaces are exterior, therefore are quickly and cheaply painted. Bates Pole prices are surprisingly low.

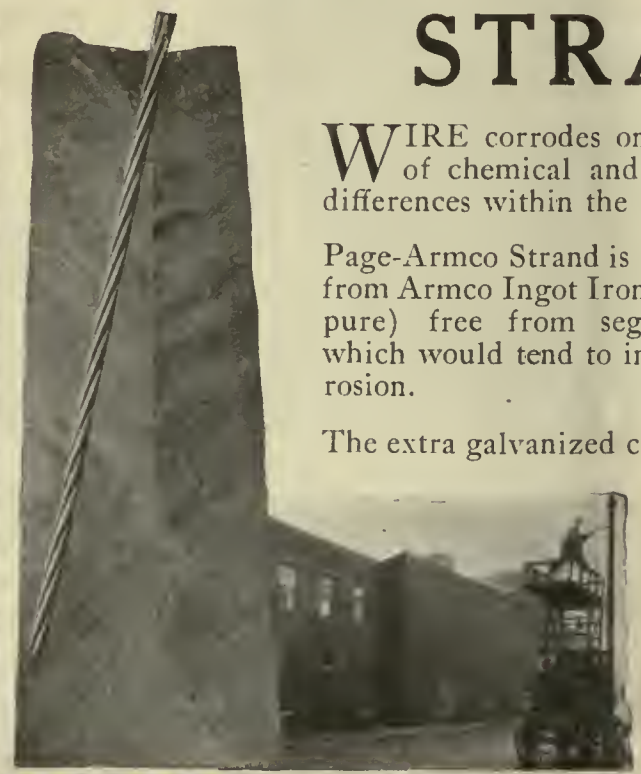
Bates Expanded Steel Truss Co.

ILLINOIS MERCHANTS BANK BLDG.,
CHICAGO, ILL.

Have you your Bates Treatise on Steel Poles?

BATES ONE PIECE EXPANDED STEEL POLES

PAGE-ARMCO STRAND WIRE



WIRE corrodes on account of chemical and physical differences within the metal.

Page-Armco Strand is produced from Armco Ingot Iron (99.84% pure) free from segregations which would tend to invite corrosion.

The extra galvanized coating on Page-Armco Strand combined with the purety of the wire insures maximum service.

Page-Armco Iron Strand is used as messenger strand, guy wire or strand, telephone wire or strand, trolley span wire, ground wire or strand, telegraph wire, and as power transmission conductors.

PAGE STEEL AND WIRE CO.

Bridgeport, Conn.

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Rods—Armco Ingot Iron and Special Analysis Steels.

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PAGE STEEL AND WIRE QUALITY PRODUCTS

ARMCO INGOT IRON



This Drew Cushion Ear

Prevents Hard Spots

The simple and effective protection of the wire at the center section of this cushion ear ends the destruction and trouble so often developing from hammer blows of the trolley. Flexible construction that cushions the blow from the trolley lengthens wire life, prevents arcing, and saves money.

In the center of the Drew cushion ear the grove is hollowed out ⅛ in. deeper than at the ends of the ear. There is no pounding of the wire at the center of the ear, for the wire is gradually driven up into this hollow, and the lips of the ear clinched over the wire. Wear on the wire at this critical point does not begin until all of this extra space at the center of the ear has been used. In actual use the clinching action of the wheel saves the wire for a remarkably long time.

Complete description and price will be sent on request.

DREW

Other Drew Products

Complete Line Direct Suspension and Catenary Material
Reclaiming Pole Sleeves
Pipe Insulators
Third Rail Insulators
High Tension Porcelain
Motorman's Safety Mirror
Pole Line Hardware
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MEMBER AMERICAN ELECTRIC RAILWAY ASSOCIATION AERA 1922

The Drew Electric & Mfg. Co.

CLEVELAND, OHIO.

ANDERSON LINE MATERIAL

with

Aetna Insulation



Round Top Straight Line Suspension



Adjustable Insulated Crossover

For over twenty years, Anderson Line Material has been a leader in the field because of its eminently satisfactory and long service. Aetna Insulation has helped to make this reputation for it.

Aetna Insulation is our own special compound. Developed years ago, it has continued ever since to meet the exacting requirements of electric railroad line service.

—Let us send our catalog—

TRADE A MARK

Reg. U. S. Pat. Off.

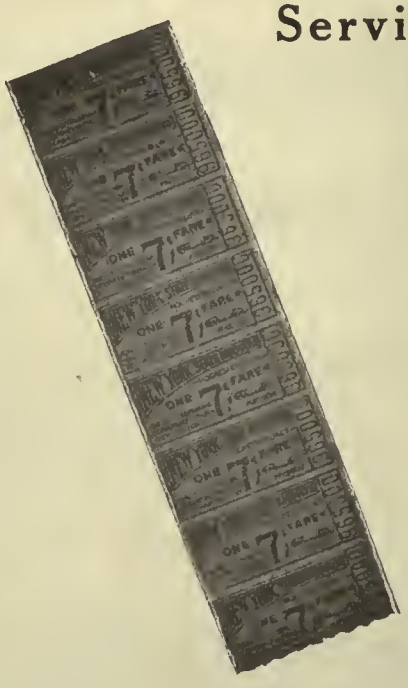
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People buy Fare Tickets in books or strips so as to avoid the necessity of carrying small change. And after having bought the tickets, the average individual will ride more frequently because he finds it easier to spend tickets than cash.

Tickets are easily collected, and by using them much of the delay caused by making change may be avoided. Thus the ticket idea helps you to give the public better service, even at rush hours.

Service attracts patrons. Tickets encourage riding. These two forces together help materially in building business.

Globe Ticket Company, 116 N. 12th Street, Philadelphia, Pa.

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10 seconds to change wheels!

BAYONET

Detachable Trolley Harps

Trolley wheel mileage can be increased and service interruptions reduced when Bayonet Trolley Harps are used. They permit removal of wheel and harp for inspection, lubrication, adjustment or repair. The change is made in a fraction of a minute—no tools needed.

With Bayonet Detachable Harps, there is no need or incentive for running a wheel which needs some minor repair. That's the kind of business which shortens the life of equipment. Bayonet Equipment helps you to prolong its life.

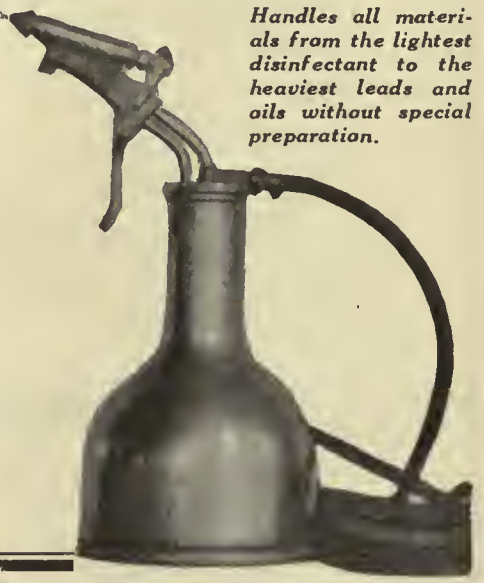


Wheels
Sleet Cutters
Bases with Detachable Pole Clamps

Bayonet Trolley Harp Co., Springfield, Ohio

1 Passenger Cars

Painting with the— Dayton Air Brush



Handles all materials from the lightest disinfectant to the heaviest leads and oils without special preparation.

Not only rough work, but the whole job of painting, enameling varnishing the car can be done with the Dayton Air Brush, with a saving of time and of labor costs that will make a real showing in the annual expense of maintaining passenger cars and all rolling stock.

Dayton Air Brushes do a finished job, and do it economically. They do not waste material—the work can be done out in the shop without any screen or booth.

Write for details and prices.

The Dayton Air Brush Company
17 Maryland Avenue, Dayton, Ohio



On Twenty New Cars of San Francisco Municipal Railway

Another indication of the wide-spread application of our equipment is found in the use of Edwards trap doors on the unique type of car illustrated above. Edwards trap door and sash fixtures have been specified by leading steam and electric railways for many years.

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Lions (*ingomyama*) and vendors of cheap motor brushes have something in common.

They are great goat-getters.

Generally speaking, our sympathies do not go to the goat except when he belongs to an operator.

Then our hat goes into the ring.

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Let your goat gambol in this safe prescribed area. It's time to stop gambling with its safety—*you said it!*

Morganite Brush Co., Inc.

Main Office and Factory:

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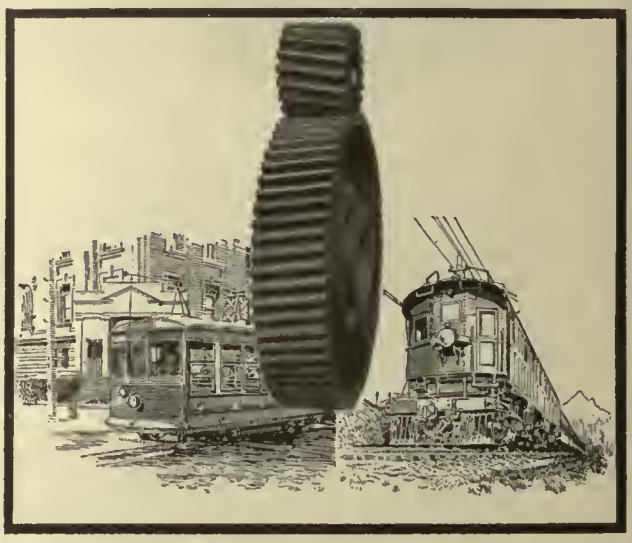
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Special Service Sales Company, 502 Delta Bldg., Los Angeles
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Nine Times Out of Ten

The quality of Electric Traction Service is in direct proportion to the quality of the equipment employed.



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If you are not using the New Nuttall 13-E trolley base you cannot only improve but can perfect that part of your equipment.

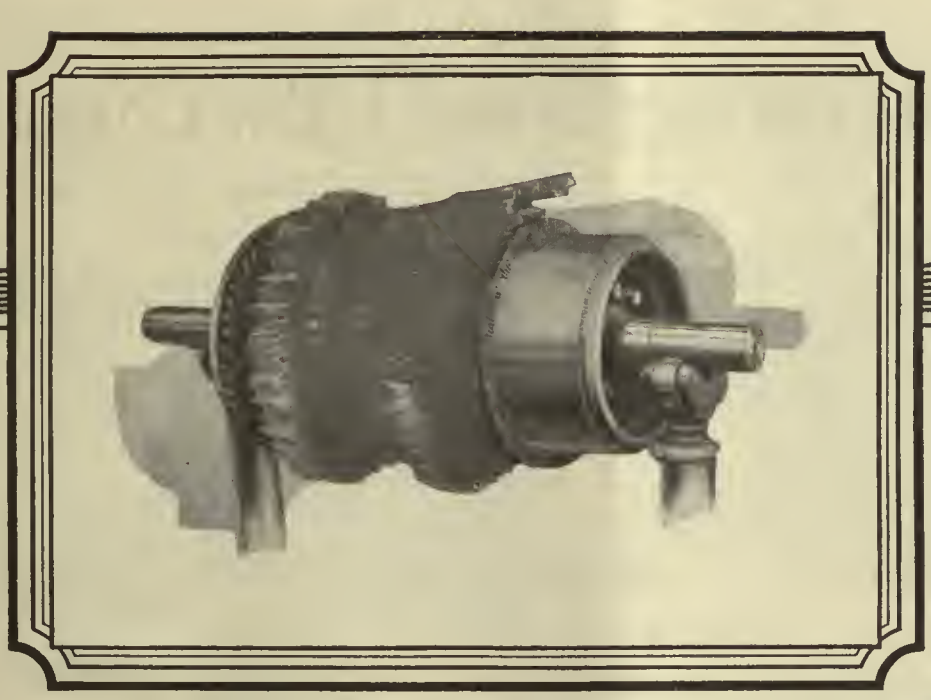
Every improvement in equipment brings a corresponding improvement in service, and every improvement in service shows instantly in more dollars and cents.

Let us send you our literature on the two sure money makers.

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All Westinghouse Electric & Mfg. Co. District Offices are Sales Representatives in the United States for the Nuttall Electric Railway and Mine Haulage Products. In Canada: Lyman Tube & Supply Co., Ltd., Montreal and Toronto.

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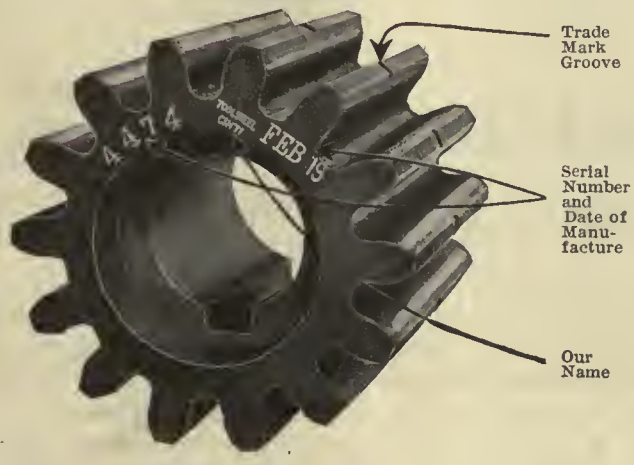
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The most perfect working guard on the market

Costs no more

Abundant references gladly furnished to verify the above claims.

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SPECIFY ROOT ALL SPRING STEEL LIFE GUARDS

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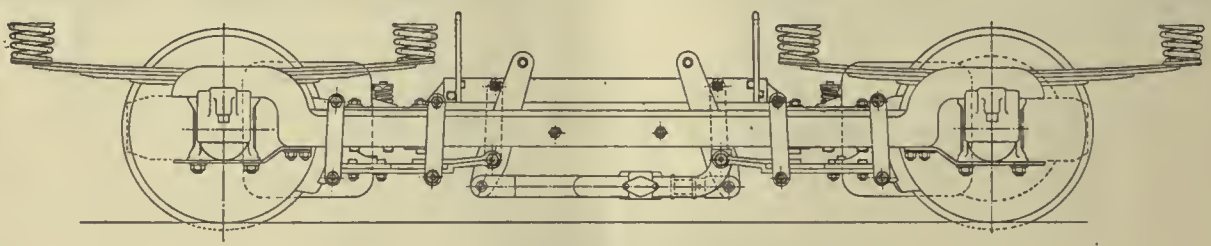
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The scraper shown here is our No. 7 for either hand or air operation.



"It Never Fails to Clean the Rails"

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Specified for One-Man Safety Cars

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For Safety and Service



IRVING SAFSTEP TRADE MARK (PATENTED) REG. U.S. PAT. OFF.
ABSOLUTELY NON-SLIPPING ALWAYS

A service based upon the convenience and safety of passengers needs this car **safstep.** Its non-slipping quality is permanently inherent in its structure — not dependent upon mats or lead or abrasive insets. Its narrow steel members grip the foot even when worn smooth. And the **safstep** is an open step — dust and dirt fall through, are not tracked into the car. Yet the mesh is so small that canes or crutches cannot go through. **Safstep** equipment means speed and safety for passengers getting on and off. Write for Catalog 3A28.

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'LECTROMELT Furnaces

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Let us tell you what it will cost to make castings, using your scrap and power.

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They prevent creeping moisture and quickly drain the petticoat in wet weather, keeping the inner area dry.

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The top section is reinforced by the intermediate section. The 3-section design makes it possible to raise the platform 16 inches higher and drop it 12 inches lower than can be done with the old-style 2-section tower.

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Frogs, Crossings, Switches and Mates
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No. 1



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PHILADELPHIA PENNSYLVANIA U.S.A.

"American" Electric Railway Automatic Signals.
RECLAIMING MACHINES } for recovering
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for single track block signal protection

United States Electric Signal Co.
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Peirce Forged Steel Pins with Drawn Separable Thimbles

Your best insurance against insulator breakage

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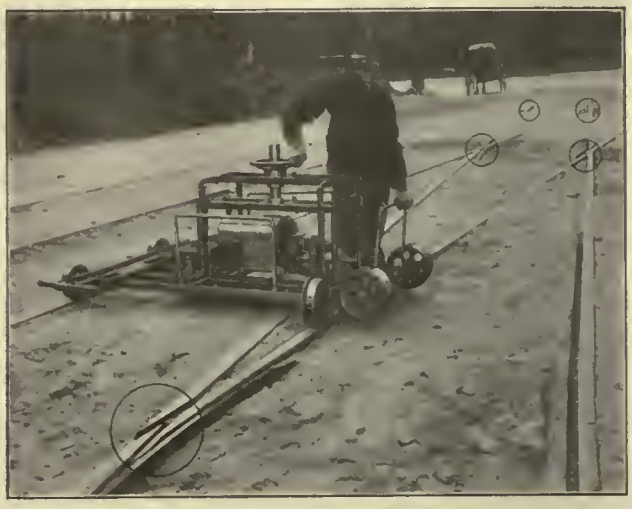
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Spring Time is Track Time

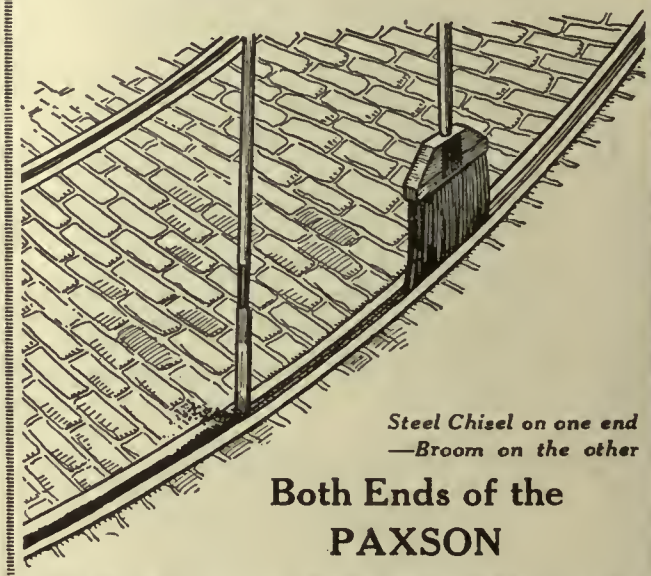
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Light in weight, fast, capable of any kind of grinding—is there a "Midget" Grinder in your track department?

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Both Ends of the PAXSON Track Broom are *Business* Ends

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Made of flat steel spring wire. Fits frogs, switches and grooves. Has strong ash handle with steel chisel on other end. Broom is light in weight but strong in construction. Send for a sample—you will be pleased.

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The Standard of the World

Made in two types for all kinds of work.

For ordinary work we recommend the Standard Type; where the current in the rail is feeble, intermittent or entirely absent, the High Sensibility Type. Both are covered by Bulletin G-200. Send for it.

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For Street and Steam Railways

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Indianapolis Economy Products That Make Dollars "Grow"

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Frogs, Croasings, Mates and Tongue-switches. Super-quality materials. Par-excellent designs. Gives many lives to one, of ordinary construction and when worn down. CAN BE RESTORED by INDIANAPOLIS WELDING.

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Fluxated heat treated Metal Electrodes, insure Uniform, Dependable Welds that are from 75 per cent to 100 per cent more efficient, than the "MELT," from the same High Grade basic stock, untreated.

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SWITCHES—MATES—FROGS—CROSSINGS
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BUCKEYE JACKS
High-grade R. R. Track and Car Jacks

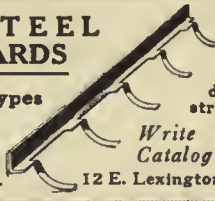
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Prompt shipment from our own stocks.
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Proven by service to economically prevent seepage and disintegration of street railway paving.
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WRITE FOR OUR NEW DESCRIPTIVE CATALOG
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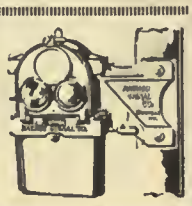
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Standard in the Electric Industries for 35 years
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Highway Crossing Bells
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Micanite armature and commutator insulation, commutator segments and rings, plate, tubes, etc., Empire oiled insulating materials; Linotape; Kablak; Mico; and other products—for the electrical insulating requirements of the railway.

Catalogs will gladly be furnished

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The retail merchant has long recognized this business principle.

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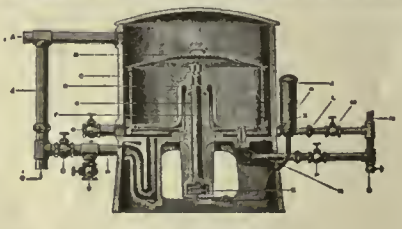
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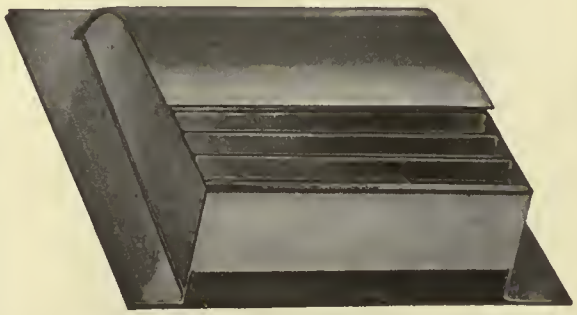
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Factory: Wakefield, Mass.

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THE N-L New Style Type C Ventilator is absolutely weatherproof, lays low on roof, looks well and meets every requirement of ventilation.

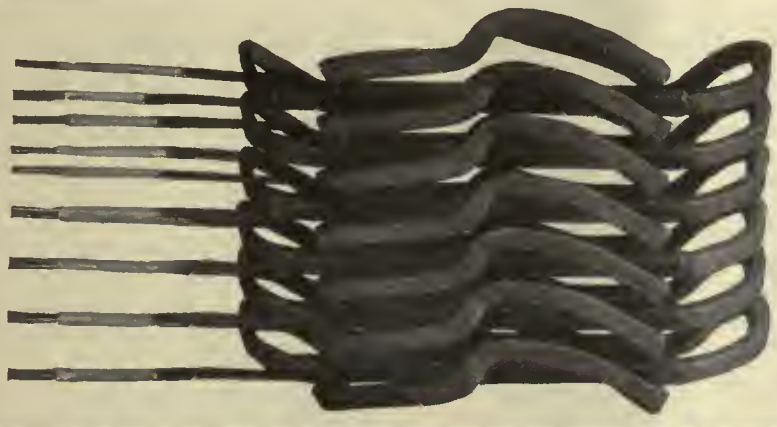
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N-L Products manufactured and sold in Canada by

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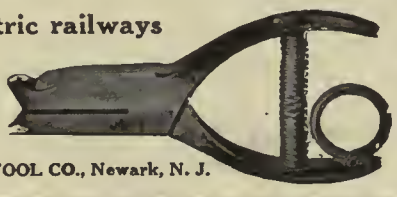
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Elliott-Thompson Electric Co.

Ajax Building, Cleveland, Ohio

75% of the electric railways use

B-V Punches



Send for Catalog

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Car Heating and Ventilation

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Made in various types and sizes to meet the requirements of service on street and city system.

Complete line of registers, counters and car fittings.

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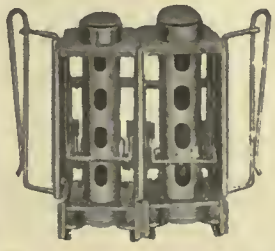
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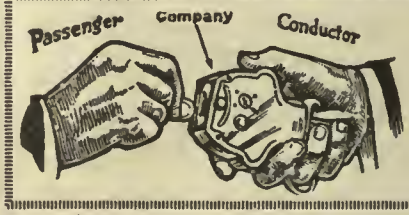
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The best changer on the market. Can be adjusted by the conductor to throw out a varying number of coins, necessary to meet changes in rates of fares.

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Each barrel a separate unit, permitting the conductor to interchange the barrels to suit his personal requirements, and to facilitate the addition of extra barrels.

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ACKLEY BRAKES
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Apply the advantages of the staffless brake with its space-saving features, to all your cars. Ackley No-Staff Brakes are adaptable to any kind of service. The eccentric chain-winding drum insures quickest applications and maximum power.

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Not always the cheapest, but ever lowest in ultimate cost

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Made of extra quality stock firmly braided and smoothly finished.
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Samples and information gladly sent.
SAMSON CORDAGE WORKS, BOSTON, MASS.

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POSITIONS VACANT

LINE Superintendent wanted for an Eastern company operating fifty miles of transmission lines within an area of forty square miles. Must be familiar with high voltage work and be able to handle men efficiently. Give reference and salary expected with first letters. P-540, Electric Railway Journal, 10th Ave. at 36th St., New York.

WANTED at good salary, competent formmaker to repair and build new armature coil forms. In applying give experience and references. (Signed) National Armature & Electric Works, Bluefield, W. Va.

POSITIONS WANTED

MASTER mechanic, twenty years' experience, would like to connect with railway department of an oil company; A1 references from past and present employers. PW-541, Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.

SUPERINTENDENT of transportation with a proven successful record of 18 years on high grade properties solicits correspondence with managers that are in need of a capable, practical, progressive superintendent of transportation, that can get results. At present employed. Present relations pleasant, personal reasons for desiring change. High grade references as to character and ability. Address PW-537, Elec. Ry. Journal, Leader-News Bldg., Cleveland, O.

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FOR SALE

20—Peter Witt Cars

Weight Complete, 33,000 lbs.

Seat 53, 4—G. E. No. 258-C Motors. K-12-H Control, West. Air Taylor Trucks. R.H. Type. Complete.

ELECTRIC EQUIPMENT CO.
Commonwealth Bldg., Philadelphia, Pa.

TRUSTEES SALE

By decree of the Common Pleas Court of Montgomery County, sitting in equity, the Norristown Trust Company, Trustee, will sell at the Court House, Norristown, Pa., in Court room No. 1 at one o'clock P. M. on Monday, April 30, 1923, all the charter and franchise rights, together with all its property, leaseholds, railway and transmission lines, rolling stock, and all property, real, personal and mixed, of the Montgomery Transit Company, whose built line extends from Trooper to Harleysville, all in Montgomery County, and about 12¾ miles in length, with contract connections into Norristown and other points. See full advertisement in Norristown Herald. Further information furnished by Trustee. Certified check of $5,000 required to be filed with Trustee one hour before sale by bidders. 10 per cent at close of sale, balance sixty (60) days after confirmation. Knock down price $150,000. Further conditions at sale.

By Norristown Trust Company,
Trustee.

Aaron S. Swartz, Jr.
Franklin L. Wright,
Solicitors.
Norristown, Penna.

FOR SALE

New Wheels

70—30 in. Cast Iron Wheels
2½ in. tread, flange 5/8 in. x 1⅛ in., hub 7½ in. x 4½ in., rough bore 3⅜ in., dish 2¼ in.

TRANSIT EQUIPMENT CO.
Cars—Motors
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SEARCHLIGHT SERVICE SECURES SATISFACTORY SALES

2004

FOR SALE

Street Cars and Parts

The Commission offers for sale the following complete street cars, car bodies, trucks, motors, etc. Sealed Tenders addressed to the Chairman, endorsed "Tender for Street Cars and Parts" will be received until noon of

May 12th, 1923

at the offices of the Commission, Public Utilities Building, 35 Yonge St., Toronto, Ontario. A cheque for 5% of the amount of the offer, payable to "The Toronto Transportation Commission," drawn on and accepted by a Canadian chartered bank, must accompany each Tender. Tenders for the whole or part of the lot offered will be received. The cars and materials offered are now on the Commission's property in Toronto, and Tenders must be based on acceptance as and where the cars and materials are located.

59	Single-truck cars complete with G.E.-67 motors.
6	Single-truck cars complete with G.E.-1000 motors.
1	Brill M.T. truck car complete with G.E.-67 motors.
2	Single truck trailer cars complete. Also 11 single-truck motor car bodies and trucks (no motors).
7	Double-truck closed motor car bodies (no motors or trucks).
10	Single-trucks (no bodies) with G.E.-1000 motors; 6 G.E.-1000 motors and 6 pairs of wheels (no trucks nor bodies).

A condition of the acceptance of any Tender is that the cars or materials must be removed by the tenderer from the property of the Commission within one calendar month from date of notification of acceptance from the Commission to the Tenderer by registered mail.

Copies of a detailed inventory may be secured and appointments to inspect may be arranged through the Executive Department, Public Utilities Building, 35 Yonge St., or the Rolling Stock Department, 4 Sherbourne Street.

The highest or any tender not necessarily accepted.

H. H. COUZENS,
General Manager,

TORONTO TRANSPORTATION COMMISSION.



No. 201—2—3—6.
4—45-ft. Interurban Passenger and Baggage Cars—Wood Body, End Entrance, Cane Seat, Monitor Roof, Motor G.E. 57, Quadruple, 2-Turn Control Westinghouse, K-14, Single End, Brakes, Westinghouse, Compressors, Nat. Brake & Electric Co. B.B. 2 Baldwin Trucks, 34-in. Wheels, 4½-in. Axles, **Each $2,000.00.**



No. 207.
Interurban Passenger and Baggage, All Steel Center Entrance, 51-ft. Car, Motor, Westinghouse, 306 V 4 Quadruple, Control Westinghouse H.L., Brakes, Westinghouse, with Nat. Brake Compressor, B.B.2, Baldwin Trucks, 34-in. Wheels, 5-in. Axles, **$4,500.00.**

Ten other cars in very good condition are covered by our Bulletin—mailed upon request.

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Buffalo, N. Y. **Phone, Fillmore 1856**

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60 cy., 13,200 or 6600 v. A.C. to 590 v. D.C., 2200 kw.

Includes the following:

Item 1—Type HCC, 16 pole, 2200 kw., 450 r.p.m., 590 v. Synchronous Converter with booster and instruments.

Item 2—3 type WC, 60 cy., 900 kva., 13,200-6600 v. primary, 368 v. secondary, water-cooled Tranaformers with 10% taps above and below normal and 50% starting tap.

Item 3—Complete 3 panel switchboard for the above. Built 1917

Has been run only for test—prompt shipment—attractive price

Picture of Converter appeared in March 17th issue.

Apply General Chemical Company
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ROTARY CONVERTER

1—300-kw., 25-cy. Weat. Will sell or trade for 60-cy. Converter of same capacity.

KANKAKEE & URBANA TRACTION CO.
Urbana, Ill.

100 lb. Steel Rails

with angle bars

FIRST CLASS RELAYERS

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Write or Wire

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or 1312 1st Natl. Bank Bldg., Pittsburgh, Pa.

Other Offices at: New York, St. Louis, Detroit, San Francisco

We carry in stock rails from 50 to 90 per yard.

The Kalamazoo Trolley Wheels

have always been made of entirely new metal, which accounts for their long life WITHOUT INJURY TO THE WIRE. Do not be misled by statements of large mileage, because a wheel that will run too long will damage the wire. If our catalogue does not show the style you need, write us—the LARGEST EXCLUSIVE TROLLEY WHEEL MAKERS IN THE WORLD.



THE STAR BRASS WORKS
KALAMAZOO, MICH., U. S. A.





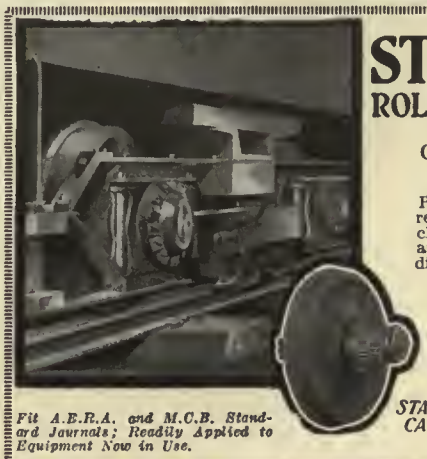
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LAWTON, MICH. U.S.A.

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'CARNEGIE'

When you think of Steel—think of Carnegie

WHAT AND WHERE TO BUY

Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

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Air Circuit Breakers
Roller-Smith Co.
Air Receivers & Aftercoolers
Ingersoll-Rand Co.
Ammeters
Roller-Smith Co.
Anchors, Guy
Elec. Service Supplies Co.
Ohio Brass Co.
Drew Elec. & Mfg. Co.
Westinghouse E. & M. Co.
Armature Shop Tools
Armature Coil Equip. Co.
Elec. Service Supplies Co.
Automatic Return Switch Stands
Ramapo Ajax Corp.
Automatic Safety Switch Stands
Ramapo Ajax Corp.
Axles
Bemis Car Truck Co.
St. Louis Car Co.
Axle Straighteners
Columbia M. W. & M. I. Co.
Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co.
Westinghouse E. & M. Co.
Babbitt Metal
More-Jones B. & M. Co.
Babbitting Devices
Columbia M. W. & M. I. Co.
Badges and Buttons
Elec. Service Sup. Co.
Int. Register Co., The
Bearings and Bearing Metals
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Drew Elec. & Mfg. Co.
General Electric Co.
Gilbert & Sons B. F. Co., A.
Le Grand, Nic
More-Jones Br. & Metal Co.
St. Louis Car Co.
Westinghouse E. & M. Co.
Bearings, Center and Roller Side
Barry Railway Supply Co.
Stucki Co., A.
Bearings, Roller
Stafford Roller Bearing Car Truck Corp.
Bearings, Roller, Ball & Thrust
Norma Co., The
Bells and Gongs
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Consolidated Car Heati'g Co.
Elec. Service Sup. Co.
St. Louis Car Co.
Boilers
Babcock & Wilcox Co.
Edgemoor Iron Co.
Boiler Tubes
Edgemoor Iron Co.
Bond Testers
Amer. Steel & Wire Co.
Elec. Service Sup. Co.
Bonding Apparatus
Amer. Steel & Wire Co.
Elec. Ry. Improvement Co.
Elec. Service Sup. Co.
Indianapolis Switch & Frog Co.
Ohio Brass Co.
Railway Track-Work Co.
Rail Welding & Bonding Co.
Bonds, Rail
Amer. Steel & Wire Co.
Drew Elec. & Mfg. Co.
Elec. Ry. Improvement Co.
Elec. Service Sup. Co.
General Electric Co.
Indianapolis Switch & Frog Co.
Ohio Brass Co.
Page Steel & Wire Co.
Railway Track Work Co.
Rail Welding & Bonding Co.
Westinghouse E. & M. Co.
Bond Testers
Roller-Smith Co.
Book Publishers
McGraw-Hill Book Co.
Boxes, Switch
Johns-Pratt Co.
Brackets and Cross Arms (See also Poles, Ties, Posts, Etc.)
Bates Exp. Steel Tr. Co.
Drew Elec. & Mfg. Co.
Electric Ry. Equipment Co.
Elec. Service Sup. Co.
Hubbard & Co.
Ohio Brass Co.
Brake Adjusters
Gould Coupler Co.
National Ry. Appliance Co.
Westinghouse Tr. Br. Co.
Brake Shoes
Amer. Br. Shoe & Fdy. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
St. Louis Car Co.
Brakes, Brake Systems and Brake Parts
Ackley Brake & Sup. Corp.
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Safety Car Devices Co.
General Electric Co.
National Brake Co.
St. Louis Car Co.
Westinghouse Tr. Br. Co.
Brooms, Brushes, Etc.
Worcester Brush & Scraper Co.
Brooms, Track, Steel and Rattan
Amer. Rattan & Reed Mfg. Co.
Paxson Co., J. W.
Brushes, Carbon
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
Morganite Brush Co.
Westinghouse E. & M. Co.
Brushes, Graphite
Morganite Brush Co.
Brushes, Wire, Pneumatic
Ingersoll-Rand Co.
Brush Holders
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
Buses, Motor
Brill Co., The J. G.
St. Louis Car Co.
Bus Seats
Hale & Kilburn Corp.
Heywood-Wakefield Co.
Bushings
National Vulcanized Fibre Co.
Bushings, Case Hardened and Manganese
Bemis Car Truck Co.
Brill Co., The J. G.
St. Louis Car Co.
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Cambric Tapes, yellow and black varnished
Irvington Varnish & Ins. Co.
Mica Insulator Co.
Carbon Brushes (See Brushes, Carbon)
Car Panel Safety Switches
Westinghouse E. & M. Co.
Cars, Dump
Differential Steel Car Co.
Car Lighting Fixtures
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Car Panel Safety Switches
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Cars, Passinger, Freight, Express, etc.
Amer. Car Co.
Brill Co., The J. G.
Kuhlman Car Co., G. C.
National Ry. Appliance Co.
St. Louis Car Co.
Wason Mfg. Co.
Cars, Gas, Rail
St. Louis Car Co.
Cars, Second Hand
Electric Equipment Co.
Transit Equipment Co.
Cars, Self-Propelled
General Electric Co.
Castings, Brass, Composition or Copper
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Columbia M. W. & M. I. Co.
Drew Elec. & Mfg. Co.
More-Jones Br. & Metal Co.
Castings, Gray Iron and Steel
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
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Castings, Malleable and Brass
Amer. Br. Shoe & Fdy. Co.
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
Le Grand, Nic
St. Louis Car Co.
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Elec. Service Sup. Co.
Ohio Brass Co.
Trolley Supply Co.
Wood Co., Chas. N.
Catenary Construction
Archbold-Brady Co.
Ceiling Car
Pantasote Co., The
Change Carriers
Cleveland Fare Box Co.
Circuit-Breakers
General Electric Co.
Roller-Smith Co.
Westinghouse E. & M. Co.
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Anderson Mfg. Co., A. & J. M.
Elec. Ry. Equipment Co.
Elec. Service Sup. Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
Cleaners and Scrapers Track (See also Snow-Plows, Sweepers and Brooms)
Brill Co., The J. G.
Root Spring Scraper Co.
St. Louis Car Co.
Clusters and Sockets
General Electric Co.
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Elliott-Thompson Elec. Co.
Rome Wire Co.
Westinghouse E. & M. Co.
Coils, Choke and Kicking
Elec. Service Sup. Co.
General Electric Co.
Westinghouse E. & M. Co.
Coin Counting Machines
Cleveland Fare Box Co.
Intern'l Register Co.
Johnson Fare Box Co.
Coin Sorting Machines
Cleveland Fare Box Co.
Coin Wrappers
Cleveland Fare Box Co.
Commutator Slotters
Elec. Service Sup. Co.
General Electric Co.
Westinghouse E. & M. Co.
Commutator Truing Devices
General Electric Co.
Commutatotrs or Parts
Cameron Elec'l Mfg. Co.
Cleveland Armature Works
Columbia M. W. & M. I. Co.
General Electric Co.
Mica Insulator Co.
Westinghouse E. & M. Co
Compressors, Air
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Tr. Br. Co.
Compressors, Air Portable
Ingersoll-Rand Co.
Condensers
Allis-Chalmers Mfg. Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse E. & M. Co.
Condensor Papers
Irvington Varnish & Ins. Co.
Connectors, Solderless
Westinghouse E. & M. Co.
Connectors, Trailer Car
Consolidated Car Heating Co.
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Controlling Systems
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Copper Wire
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Cord Adjusters
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Cord, Bell, Trolley, Register,
Brill Co., The J. G.
Elec. Service Sup. Co.
Internat'l Register Co., The
Roebling's Sons Co., John A.
St. Louis Car Co.
Samson Cordage Works
Cord Connectors and Couplers
Elec. Service Sup. Co.
Samson Cordage Works
Wood Co., Chas. N.
Cord, Trolley
Trolley Supply Co.
Couplers, Car
Brill Co., The J. G.
Gould Coupler Co.
Ohio Brass Co.
St. Louis Car Co.
Westinghouse Tr. Br. Co.
Cranes
Allis-Chalmers Mfg. Co.
Cross Arms (See Brackets)
Crossing Foundations
International Steel Tie Co.
Crossings
Ramapo Ajax Corp.
Crossing Signals (See Signals, Crossing)
Crossing, Frog & Switch
Wharton, Jr., & Co., Wm.
Ramapo Ajax Corp.
Crossing Manganese
Indianapolis Switch & Frog Co.
Ramapo Ajax Corp.
Crossings, Track (See Track, Special Work)
Crossings, Trolley
Ohio Brass Co.
Culverts
Newport Culvert Co.
Curtains and Curtain Fixtures
Brill Co., The J. G.
Edwards Co., Inc.,The O.M.
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Drills, Rock
Ingersoll-Rand Co.
Drills, Track
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Ingersoll-Rand Co.
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Dryers, Sand
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Railway Track-Work Co.
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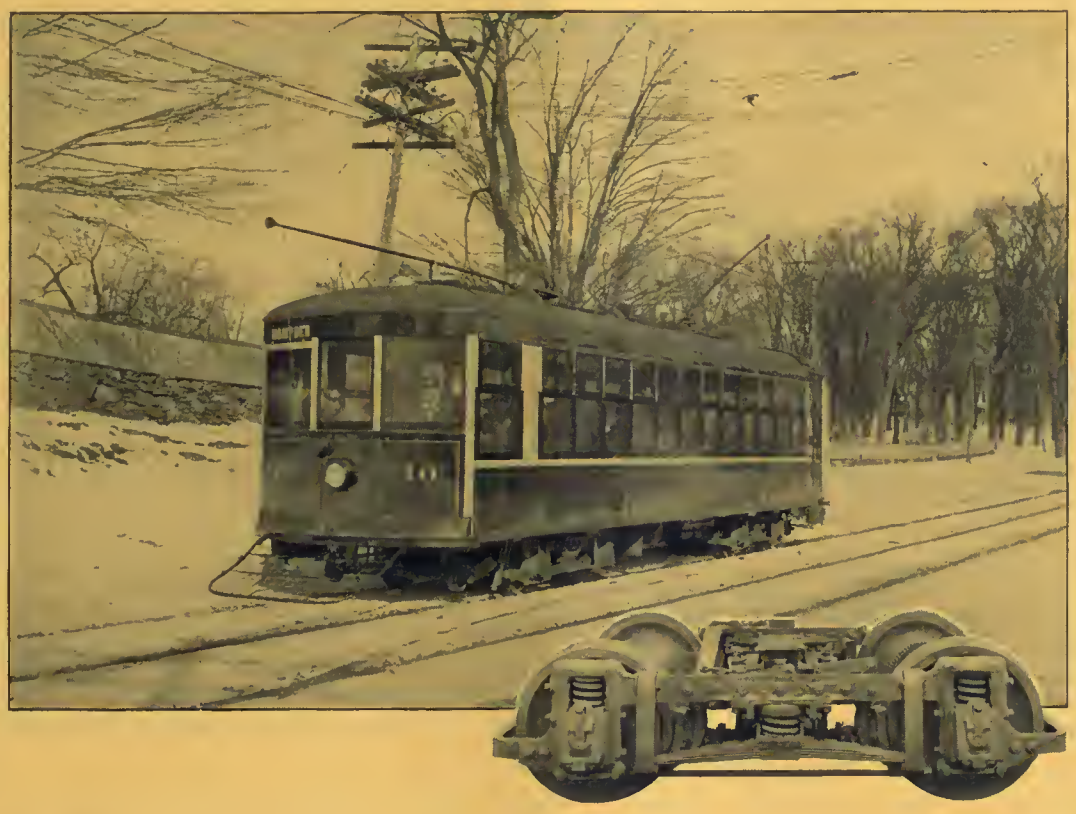
Ramapo Iron Works
Established 1881
Ajax Forge Company
Established 1883

RAMAPO AJAX CORPORATION
Successor
HILLBURN, NEW YORK
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all grades of poles; also any butt-treating specifications
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Universal Safety Tread Company
Offices in all Principal Cities
40 Court Street Send for Catalogue RR Boston, Mass.

"Make it of Vul-Cot Fibre"
NATIONAL VULCANIZED FIBRE CO.
WILMINGTON DELAWARE



Double-Truck Safety Car

Mounted on Brill Low-Level Trucks No. 77-E

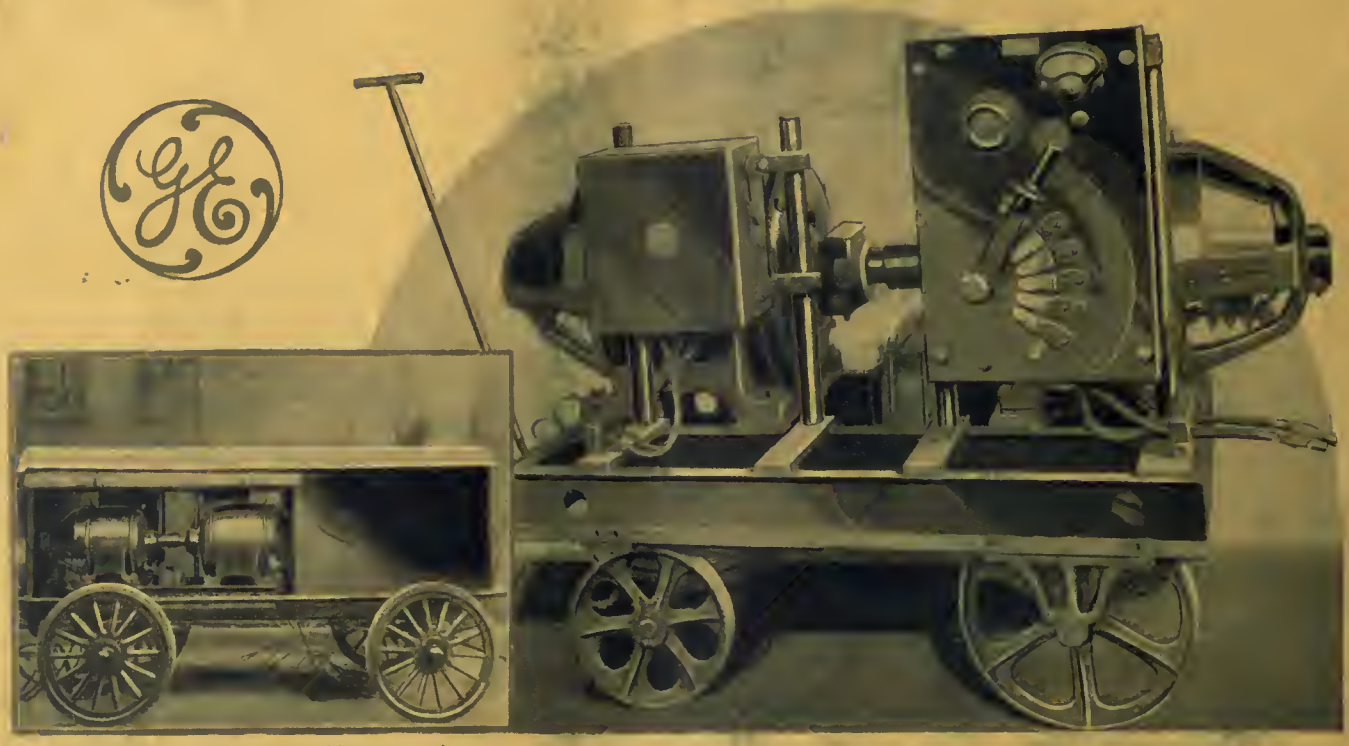
In this double-truck type Safety Car are combined the advantages of light weight and a carrying capacity equal to the requirements of practically any service. It weighs approximately 28,000 lb. complete, and has a seating capacity of 54.

Also, Brill 77-E trucks equipped with 26-in. diameter wheels not only carry the car body very low but operate in a steady and most comfortable manner.

Complete information will be furnished upon request.

THE J. G. BRILL COMPANY
PHILADELPHIA, PA.
AMERICAN CAR CO. ST. LOUIS MO. — G.C. KUHLMAN CAR CO. CLEVELAND OHIO — WASON MANF'G CO. SPRINGFIELD, MASS.

Here's the Arc Welder for You



One Railway Company uses this means of mounting "WD-9" for track work.

"WD-9" does great shop and track work!

"WD-9" was specially designed to run at constant speed where the supply circuit varies even as much as 400 volts minimum or 650 volts maximum. It gives the operator constant conditions in the arc—and that means good welding. It is a compact, well-built set—easy to use and economical to operate.

Here are some of the things "WD-9" will do right for you if you team it up with a welding operator who knows his business. It repairs truck frames—brake hangers—journal boxes—gear cases—resistors—drawheads and underframing—flanges on worn car wheels—worn journals on armature shafts—broken and worn motor frames. It readily repairs railway tracks—and is used for rail bonding.

Get acquainted with "WD-9" at any of the G-E Sales Offices which are in all large cities.

Representative Users

Eastern Mass. Street Railway
Manchester Street Railway
Schenectady Railway Co.
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GENERAL ELECTRIC

43B-750

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ELECTRIC RAILWAY JOURNAL



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TROLLEY CORD
Ideal for one-man cars

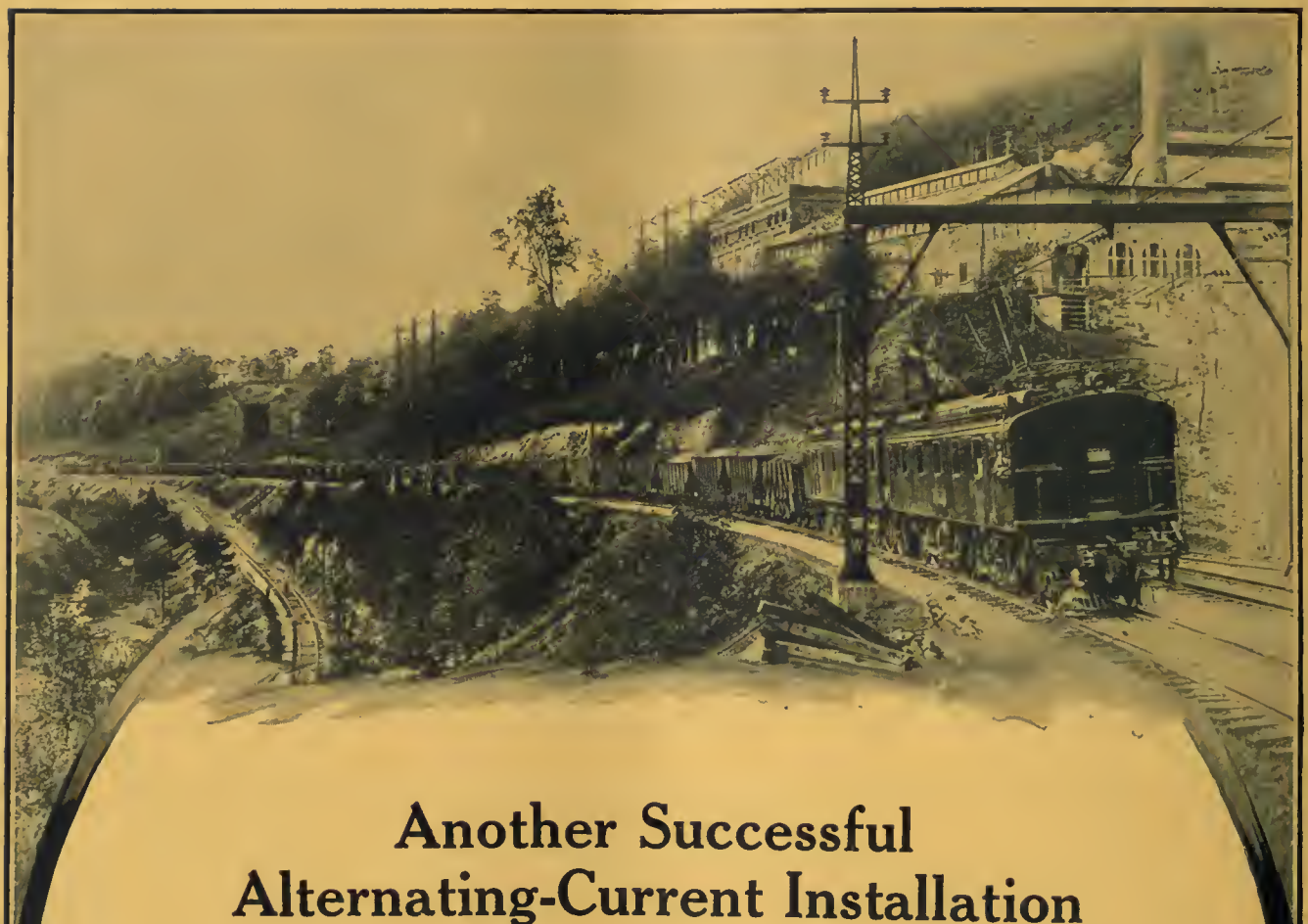
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Extra quality stock, firmly braided and smoothly finished to withstand constant abrasion and jerking.

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Boston, Mass.



Another Successful Alternating-Current Installation

Winding over and through the mountains of West Virginia, hauling approximately two million tons a month, the electric locomotives of the Norfolk & Western have more than met expectations.

As a proof of the successful operation of this alternating-current electrification, the Norfolk & Western Railway is extending its electrified zone a distance of thirty route miles.

This extension will assure a more rapid and efficient handling of the 3250-ton trains through this coal-mining region which includes the 2% Elkhorn grade over which these trains operate at a speed of 14 miles per hour.

Were steam locomotives used to handle the present tonnages the number required would be at least three times the number of electrics now employed.

MEMBER AERA

THE BALDWIN LOCOMOTIVE WORKS - WESTINGHOUSE ELECTRIC MFG. CO.
PHILADELPHIA - PA EAST PITTSBURGH, PA.

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The special problems met and how they were solved on this most recently completed elevated line. This first of two articles deals particularly with the signals, trips, electric circuits and air lines.

How Trainmen Can Sell Transportation 715

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Report of John A. Beeler recommends extensive relocation of rail lines, rerouting of cars, suggests scheme for speeding up and amplifying service and relieving traffic congestion. Contemplates expenditures of $2,500,000 but saves $850,000 annually.

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Merit System Works Well in Los Angeles 721
By J. G. Jeffrey.
In this system a bonus is given for good records and in 1922 nearly $95,000 was distributed as bonuses and special prizes among the trainmen. Methods of keeping records are described.

New Shops for Toronto 723
More than $2,000,000 is being spent on shops, office building and storehouse for the Toronto Railway system. Full particulars of the shop layout are given.

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The United Electric Railways is making power plant improvements to cost upward of a million dollars. New boilers equipped to burn pulverized coal are being installed in one-half of the boiler houses.

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Scope of the Journal Field

IN this column last week it was pointed out that few papers are required to cover such a wide range of subjects as is the JOURNAL. To make this statement more tangible the following partial list of the broad fields of activity comprised in the electric railway business is given:

Metallurgy
Finance
Claims
Accounting
Transit plans
Appraisals
Corporation law
Regulation
Advertising
Labor matters
Insurance
Public relations
Maintenance
Signaling
Welding
Civil engineering
Mechanical engineering
Electrical engineering
Accident prevention
Association activities
Traffic development
Market conditions
Purchases and stores
Foreign news
Lubrication
Fuel supply
Standardization
Traffic regulation
Management
Energy saving
Express and freight handling
Fares and fare collection
Heavy electric traction
Statistics and cost trends
Buses, co-ordination and competition

To maintain a balance of subject matter in such a wide range of activity and cover these systematically requires a very diversified experience in the editorial staff. Such a service is what the JOURNAL endeavors to supply.

Circulation of this issue, 5,950 **Advertising Index—Alphabetical, 44; Classified, 40, 42; Seaarchlight Section, 39**

SAFETY CAR PIONEERS



8 YEARS OF DEVELOPMENT

THE year 1915 witnessed the inception of the Safety Car. The first of the cars ever placed in service—on the properties of the Seattle Electric Co., the Everett (Wash.) Division of the Puget Sound International Railway and Power Co., and the Illinois Traction Co.—were equipped with our Air Brake and Safety Car Control Devices.

It was this equipment which made it possible to realize one of the fundamental objects of the car—the saving in man power and platform expense.

Throughout the past eight years we have devoted ourselves to Safety Car development. Naturally, it is a source of pride to us that we have shared responsibility for the marvelous growth of this new form of transportation, and that approximately 6,500 Safety Cars, made possible by our equipment, are now operating in 300 cities.

Let us show you how our equipment can be made to solve *your* problems. Applicable to new cars or old—any type.



SAFETY CAR DEVICES CO.
OF ST. LOUIS, MO.

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COMPLETE AIR BRAKE EQUIPMENT for EVERY CLASS of SERVICE

Prepare for the Summer Throngs

HEAVY summer traffic requires extra precaution to make sure that your cars are equipped with the best, up-to-date braking facilities. Westinghouse Traction Brakes cover the entire field of electric railway operation, and among the various types you will find one that is exactly suited to your needs, providing the necessary margin of safety for any emergency and giving dependable, low-cost service. Check the list below and consult with our engineers.

Schedule SM-3 (*Straight Air*)—For single cars in light, slow-speed city service.

Schedule SME (*Semi-Automatic*)—For single cars or two-car trains in city service.

Schedule AMM (*Combined Automatic and Straight Air*)—For single cars or short multiple-unit trains in heavy city, suburban, or interurban service.

Schedule AMU (*Automatic*)—For long trains in high-speed interurban, elevated or subway service.

Schedule AMUE (*Electro-Pneumatic*)—For trains of any length in rapid transit, elevated or subway lines.

Variable Load Brake—For trains of any length on elevated or subway systems. Same as AMUE, plus features for varying brake cylinder pressure so as to obtain uniform retardation on empty, partially loaded or fully loaded trains.

Schedule 14 EL (*Combined Automatic and Independent Control*)—For electric locomotives.

Automotive Air Brake—A new development providing better braking facilities for the safe and efficient operation of Motor Buses, Trucks, Touring Cars, Trackless Trolley Cars and Rail Motor Vehicles.

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Insurance plus Marsh & McLennan Service

Have You Finished the Job Right?

Your personnel has been chosen wisely; your plant has been planned carefully; your methods are the last word in efficiency and your products find an insatiate market. Have you finished the job right?

If fire can damage your plant or accidents disorganize your personnel and drive your customers to waiting competitors, you cannot rest secure.

Insurance is the final and fitting step of the wise executive who finishes the job right. He takes care of today and has the vision to protect himself against the emergency that may come at any time. He is prepared against all contingencies by having adequate insurance for his business in all its branches.

As carefully as you choose your banker, just as carefully should you choose your insurance broker. The one assists, the other safeguards your business.

"He who serves best profits most."

MARSH & McLENNAN

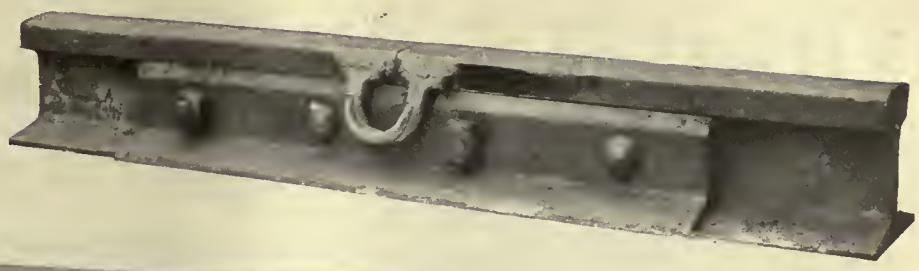
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AW-8 Arc Weld Bond Applied to Ball of Rail



AW-7 Arc Weld Bond Applied to Base of Rail

WHAT DOES Ⓑ MEAN to YOU —on RAIL BONDS?

O-B means perfected manufacturing processes applied to practical and efficient designs. O-B Rail Bonds are made uniformly from selected materials and reach you only after systematic and thorough inspection.

O-B means extreme care has been exercised in firmly welding the copper cable into the terminals of each rail bond. Good design and careful manufacture of terminals make the copper strands withstand track vibrations.

O-B means that concentric lay cable of commercially pure copper has been used. Bond cable is held to strict specifications. Each type of O-B Rail Bond has ample copper to safely carry its rated current.

O-B means that you are getting Rail Bonds that have stood the test of experience and time. O-B Bonds stand wear —and the terminals are designed to encourage good installation.

By Specifying O-B Rail Bonds You Are Taking the First Step Towards a 100% Job of Bonding.



Type F Compressed Terminal Bond applied to Web of Rail under Splice Bar.



Type E Compressed Terminal Bond applied to Web of Rail around Splice Bar.

The Ohio Ⓑ Brass Co.
Mansfield, Ohio, U.S.A.

New York Philadelphia Pittsburgh Charleston, W.Va. Chicago Los Angeles San Francisco Paris, France
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QUALITY TIES of the Exact Grade You Specify



PURCHASING Cross Ties is a big problem. It is true that the A. R. E. A. specifications set a purchasing standard, but experience has shown that many difficulties result from the lax enforcement of these specifications.

The specifications are issued to purchasing agents to govern their buying—also to the producers to show them what to make and how their output is to be graded; but unless you insist upon and enforce these standards the producer will make ties just as small as you will take them. In other words, you will not get full value for your tie dollar.

When you order ties to a certain specification from the International Organization we interpret it as our duty to secure for you ties in exact accordance with your specification, without subterfuge, overgrading or deviation in any form.

If you specify grade 5, you will receive sound hewed, rectangular ties 7 in. by 9 in. and not a tie that *might pass* as a grade 5.

Likewise, you get full tie value when specifying grades 4, 3, 2, or 1. Each Tie is permanently marked in the woods so that its grade can be identified, at any later time, for check inspection.

The purpose of this International Tie Organization is to produce sound, durable ties of uniform size in strict accordance with A. R. E. A. grades.

A trial order will demonstrate our claims.

International Creosoting & Construction Co.

General Office—Galveston, Texas

Plants: Texarkana, Texas Beaumont, Texas Galveston, Texas

There is only one

best paved street track—

It's that with the lowest cost per foot per year, including first cost and maintenance. Get the figures on Steel Twin Tie track from us or from users.

The International Steel Tie Company
Cleveland



Steel Twin Tie Track



Looking east along King Street at the intersection of King and George Streets, Sidney, New South Wales. The government tramways, in four directions, operate with a headway of eight seconds. It requires Phono-Electric, of course, for this service.

The Whole World Respects Phono-Electric!

It is a fitting tribute to American Electric Railroading to find America's standard for severe wear—Phono-Electric—responding to the severest test that far off New South Wales can offer. Tho' they scoured the world, the engineers of Sidney's Government tramway followed the footsteps of their American contemporaries to Bridgeport for uninterrupted service and far-sighted economy.

"Bridgeport" BRASS CO. TRADE MARK U.S.A. U.S.A.

Phono-Electric Trolley Wire



The Queen Victoria buildings on George Street, Sidney, one block south of King Street, 2800 trams pass this spot every day. Phono-Electric delivers the uninterrupted service that results in far-sighted economy.



ADVERTISE

your service to these places

Keystone-Hunter Illuminated Destination Signs do more than point out the destination points of your cars. Throughout the day and night these signs tell an animated story of your service to beaches, parks and recreation spots.

KEYSTONE-HUNTER
ILLUMINATED DESTINATION SIGNS

A car is nothing but a car unless its destination point is discernible at a distance convenient for the person in the street. Keystone-Hunter Signs make each car an easily distinguished accommodation and constantly remind the person in the street that you are selling service to beaches, parks and recreation spots. By constantly suggesting these places on your moving cars you are conducting a mighty persuasive advertising campaign.

Get these signs on cars, elevated and surface trains.



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Manufacturer of Railway Material and Electrical Supplies

PHILADELPHIA, 17th and Cambria Streets — NEW YORK, 50 Church Street

CHICAGO, Monadnock Building

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Pointed Remarks About Wasteful Advertising by~

Hon. Sidney Anderson

MR. ANDERSON was Chairman of the Joint Commission of Agricultural Inquiry that made the most remarkable and valuable study of distribution costs ever made by a governmental agency.

"THERE has been a feeling that everything produced could be sold to everybody everywhere. We would not think much of the General who carefully placed his batteries at the strategic points and then directed them to fire in the general direction of the enemy without knowing where the enemy was."

* * * * *

"I think we ought to take the measure of the customer and build our suit to fit him."

* * * * *

"I plead for more knowledge of distribution, and the relationship of the agencies which con-

THE ASSOCIATED BUSINESS PAPERS, INC.

100% A. B. C. Audited—Reaching 54

Electric Railway Journal is the A. B. P. Paper

stitute its machinery, and through such knowledge and sound experimentation, for the development of the means and facilities that will avoid waste and promote economic distribution at the lowest cost."

The conclusions to be drawn from the investigations of Mr. Anderson's Commission are that all advertising and sales effort MUST be more highly SPECIALIZED, if the mounting costs of distribution are to be cut down.

That Concentration beats Diffusion of effort is a primary principle, but sometimes when men begin to think in current advertising terms, they get this principle reversed.

If you really want to make an auspicious start towards cutting distribution costs, use the most highly specialized and wasteless advertising machinery known—the A. B. P. type of business paper.

Aim your advertising "guns" at YOUR buyers and nowhere else. Specialize the copy appeal and put it in the Business Papers reaching only the fields you desire to cultivate—papers with the highest known degree of READER INTEREST.

Groups of buyers, buying hundreds of millions annually, can be reached effectively through A. B. P. papers for a few thousands of dollars. Cut out the waste—CONCENTRATE.

A. B. P.

"Member of The Associated Business Papers, Inc.", means proven circulations, PLUS the highest standards in all other departments.



Headquarters, 220 West 42d Street, New York

Different Fields of Trade and Industry

in the Electric Railway Industry



Confidence!

Confidence in the "P & H" Guaranteed Penetration Process" has been thoroughly established by the manner in which it has withstood every test. The lead shown here is typical of the many lines throughout the nation built of "P & H" Guaranteed Penetration Process Poles

The "P & H" Guaranteed Penetration Process

guarantees to the buyer, in writing, a full one-half inch uniform penetration of the preservative throughout the ground line area. The Butt-Treating price is refunded on any pole that does not show this definite specified result.

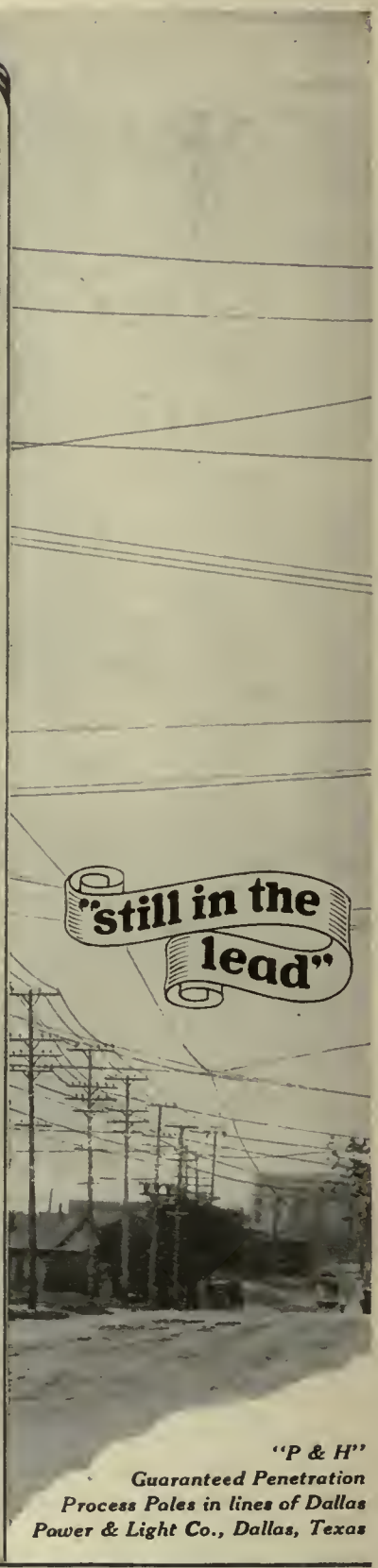
Don't be satisfied with guesswork—insist on the genuine "P & H" if you want the lowest maintenance costs, the most reliable pole service, the longest pole life.

We can fill any pole needs—for Butt-Treated and untreated Northern White and Western Red Cedar Poles—or for any form of Butt-Treatment.

Prompt shipment assured by the convenient location of our yards in the North Central and Western States.

Get the facts about Butt-Treatments—write for folder.

Copyright 1922, by P. & H. Co.



"P & H" Guaranteed Penetration Process Poles in lines of Dallas Power & Light Co., Dallas, Texas

PAGE AND HILL CO.

MINNEAPOLIS, MINN.

Grand Rapids, Mich., Powers Bldg.

New York, N. Y. 50 Church St. | Kansas City, Mo. 717 Bryant Bldg. | Houston, Texas, 1111 Carter Bldg. | Buffalo, N. Y. 950 Ellicott Sq. Bldg

Chicago, Ill., 19 So. LaSalle St. | Omaha, Neb., 513 Electric Bldg. | Dallas, Texas, 311 Sumpter Bldg. | Louisville, Ky. 1416 Starks Bldg.



Over 10,000 cars, here and abroad, are equipped with one or more of these—

NATIONAL PNEUMATIC

Door and Step Control
Motorman's Signal Lights
Safety Interlocking Door Control
Door and Step Operating Mechanism
Multiple Unit Door Control

Let us quote for your new cars

National Pneumatic Company, Inc.

Originators and Manufacturers

PRINCIPAL OFFICE: 50 Church Street, NEW YORK

Philadelphia—Colonial Trust Building Chicago—McCormick Building

Works—Rahway, New Jersey

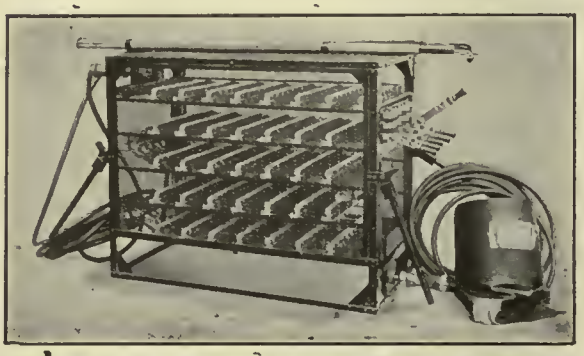
Manufactured in Canada by

Dominion Wheel & Foundries, Ltd., Toronto, Ont.

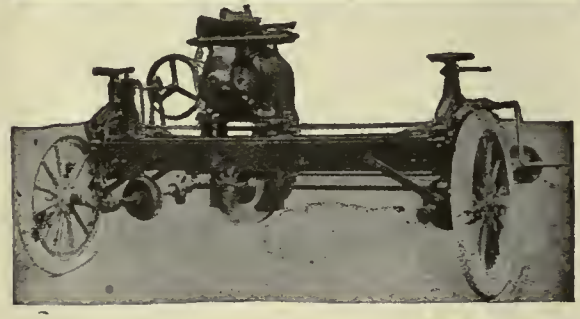


Traffic Will Increase —on a Smoother Track

A few dollars outlay repairing and improving track will be regained many times over in increased traffic, better-satisfied passengers, and reduced cost of maintaining cars.









These equipments have been chosen by 439 Companies in every State and almost every country of the civilized World to secure smooth-running track and reduce maintenance costs.

"AJAX"
Electric Arc Welder

The most modern welder on the market, designed for the reclamation of rails and special work at lowest cost. Light, rugged and simple, it is especially adapted for the usual track crew organization.

"ATLAS"
Rail Grinder

A low cost, economical rotary grinder for removing surplus metal after building up joints or special work with "AJAX" Welder. Extremely simple to operate and maintain.

"UNIVERSAL"
Rotary Track Grinder

An improved rotary grinder with valuable features such as a tilting grinding wheel, large rubber-tired derail wheels, and three point suspension of grinding wheel arbor bearing for maximum stability.

"RECIPROCATING"
Track Grinder

For absolutely removing all traces of corrugation, and for smoothing out joints at the first signs of "Cupping," there is no apparatus or method which can supplant the RECIPROCATING GRINDER. One or more of these machines should be in constant service on every road to insure smooth track at all times.

Order Necessary Equipment Now!

30 Church St., New York

Railway Track-work Co., Philadelphia, Pa.



The Big Six in Street Railway Lubrication

Galena Electric Car Oil

The lubricant of unfailing service. Yields greatest mileage and practically eliminates hot bearings.

Galena Power House Engine Oil

A product built specially for this use, with a record of many years of efficient performance.

Galena Power House Valve Oil

The finest cylinder lubricant made. Manufactured from selected stocks by exclusively Galena process. Has won a world-wide reputation.

Galena Turbine Oils

Non emulsifying. Clear, clean—economical. A "body" that is dependable and lasting. A grade to suit each requirement of service.

Galena Air Compressor Oil

An oil that has proved its superiority in every comparative test. Holds compression perfectly and will not carbonize.

Galena Gear Grease

The ideal lubricant for gears and pinions. Its ever clinging body cushions the blows of service and protects and preserves this equipment.

There is a time-tried and service-tested Galena lubricant for every Electric railway requirement.

Galena-Signal Oil Company

New York - Franklin, Pa. - Chicago

and offices in principal cities

The quality once sought is worth maintaining



Use your G-E Catalogs



"G-E Parts for G-E Equipment," A Good Motto and why:

—Operating economy is determined by performance. Cheap materials, necessarily requiring frequent replacement, are most expensive in the end.

—You cannot be assured the good will of a public served with equipment made unreliable by renewal parts purchased at random.

—G-E Renewal Parts Catalogs, specially compiled to cover ***your equipment,*** facilitate prompt shipments and cut down losses in revenue from "shopped" cars.

—Only the maker of your G-E equipment can make parts which exactly duplicate the originals. Could any other parts give better service?

General Electric Company

General Office Schenectady, N.Y.

Sales Offices in all large cities

49-244

ELECTRIC RAILWAY JOURNAL

Consolidation of Street Railway Journal and Electric Railway Review

Published by McGraw-Hill Company, Inc.

HENRY W. BLAKE and HARRY L. BROWN, *Editors*

Volume 61 New York, Saturday, April 28, 1923 *Number* 17

Significance of the Boiler-Room Changes at Providence

THE United Electric Railways, Providence, R. I., has shown its confidence in pulverized coal by equipping one section of its boiler house with equipment for burning fuel in this form. All bridges behind have not been burned, because a number of the stoker-fired boilers remain, and it will be possible to burn oil under the new boilers in place of coal if necessary. However, the pulverizing apparatus is being installed in the confident belief that it will prove economical and convenient. The plant is of peculiar interest in the electric railway field because it is of moderate size, it is provided with facilities for trying out different kinds of fuel, and it was built long enough after the Lakeside plant in Milwaukee to permit experience with that plant to be utilized.

The railway company would have preferred to postpone announcement of the details of this plant until after it had been in operation for a time. However, a partial description of the preliminary design was published in at least one of the foreign engineering papers, and it seemed desirable, therefore, to print in the ELECTRIC RAILWAY JOURNAL a fairly complete statement of the present status of the work. This has been prepared in collaboration with the railway company and the manufacturers and appears elsewhere in this issue. It will be followed in due course by another article on the operation of the plant.

Coming U. S. Chamber Meeting of Special Interest to Interurbans

THE predominant theme of the eleventh annual meeting of the Chamber of Commerce of the United States in New York, May 7 to 10, is transportation—transportation in its national aspects. This meeting might be characterized for its intent as the Federal Electric Railways Commission proceedings of the steam roads, for its main accomplishment will be to bring to public attention a great deal of information about the true aspects of the transportation situation. Many of its phases will be discussed, including the matter of rates and their relation to manufacturing costs and to distribution, transportation obstructions to distribution, store door deliveries and collections, railway financing, co-ordination of trunk line, highway, electric railway and water-way transportation systems, etc.

The chamber is making a study "comprehensive of the whole problem from every point of view, hoping to aid in the ultimate formulation of a national transportation policy." This study has been intrusted to the Transportation Conference, whose work will continue considerably beyond the May meeting. P. H. Gadsden is a member of the conference, and steps are being taken to present complete and enlightening data about the electric railways.

There is an unusual opportunity here for the electric railway industry to bring about a general appreciation of the magnitude of its services, where they fit into the general scheme, and what they could accomplish in relieving the steam roads if utilized in an intelligent plan that comprehended their full abilities.

This is particularly an opportunity for the electric interurban lines. They did not derive much benefit from the Federal commission proceedings as there were primarily devoted to the street railways. But in the present case they will have their inning.

Electric railway men will therefore find special interest in this eleventh annual meeting of the chamber, and they should plan to attend its sessions and take active part in the discussions. In other words, they should make the electric railways felt in these councils embodying all transportation agencies.

One Hundred Years of Transportation

SO FEEBLE were the means of transportation, comparatively, prior to the advent of the railroad that transportation may fairly be said to have had its beginning with the chartering of the Delaware & Hudson Canal Company, which celebrated the hundredth anniversary of its founding with fitting occasion on April 23 in New York. This is the first centenary of a railroad company.

As the name indicates, the company incorporated by special act of the New York Legislature on April 23, 1823, had the purpose first in view of promoting and building a canal. This project was quickly followed, however, by a grant from the Pennsylvania Legislature on April 5, 1826, authorizing construction of a railroad from the head of the canal at Honesdale to the anthracite coal mines at Carbondale. And then the "Stourbridge Lion," bought in England by the Delaware & Hudson, made its first trip on Aug. 8, 1829. It was the first steam locomotive to run on a railroad in America.

The American public might well stop to ponder the marvelous accomplishments of the century concluded by this significant anniversary. The tremendous importance of anthracite coal, previously unavailable but brought to our civilization by the Delaware & Hudson, merely typifies the part of the railroads in the unparalleled development of the life and commerce of the United States.

Somehow the accomplishments wrought by the railroads must be dramatized so that the public will comprehend what it owes them. If there could be put into the 1923 mind a composite picture of the strides

made since 1823, for which transportation is peculiarly responsible, there would be a quick reversal of public attitude to the eager, friendly interest in the railways that prevailed during the first fifty years of transportation. The present desire, so commonly expressed, to tighten the ban of regulation is the product largely of ignorance, and of misrepresentation by those who would capitalize that ignorance for selfish political gain.

In view of present agitation it is not to be wondered at that Leonore F. Loree, eighth president of the D. & H., in his centenary celebration address, attacked the system which he says has vested legislative powers in commissions. They exercise these powers in making special rules applicable only to the particular proceedings pending, as contrasted with the general, basic rules of conduct laid down by the true legislature. "Railroading is no longer a business; it has become a calamity," he declared.

But the remedy is clear. It is only that we must find the means and the talent to counteract this ignorance with understanding, and prevent misrepresentation by securing honest public officials. In this movement electric railways are as vitally interested as the trunk lines, and there should be a joining of hands in this matter of public relations. Mr. Loree sounded the keynote of progress by concluding his address with an appeal to take up this work with the courage and confidence shown by the railroad pioneers in overcoming the physical obstacles which beset them.

The Right Kind of Accounting Conduces to Better Control of Expenditures

NATURALLY the first duty of the electric railway accountant has been to meet the needs of the general officers of the company. Now that this duty is reasonably well accomplished in present-day accounting, attention is being turned toward departmental requirements. This is evidenced by the work of joint committees in the electric railway associations, such as those on claims accounting and engineering accounting.

Take, for example, the matter of engineering accounting. The engineering department expends large sums for construction and maintenance, which it can do with best economy only when it has full data. The information compiled primarily for the executive department has not been in sufficient detail for this purpose, hence the engineering departments have usually had to shift for themselves very largely in determining costs. It is now becoming recognized that the accounting department contains the experts on cost statistics who should assume the duty of furnishing all such data required. This means more work for the accountant, but increased prestige. It involves close co-operation with the engineering department, to determine what information is needed, and in what form. Obviously, judgment must be used in making demands upon the accounting department, for the subdivision of costs can be carried too far; that is, farther than is necessary in accomplishing the purpose of impelling control of expenditures. However, the information should be in sufficient detail to permit prompt compliance with requests for special information, even if these are not likely to occur more than two or three times a year, for segregation of costs by types of construction, for example, can be made cheaply as a routine matter, whereas special researches to meet occasional demands not anticipated in the routine are expensive and often very unsatisfactory.

What has been said of the engineering department applies also to other departments. In fact, there is practically no limit to the possibilities for usefulness on the part of the accounting department, if its head has the vision to appreciate the needs of the other departments.

A Great Opportunity in New Orleans

THE local transportation situation in New Orleans has been a good example of what street railroading ought not to be. Physically and financially this system stands out as one of those instances where history reflects the kind of promotion and management that have been the cause of so much public distrust and trouble for present-day managements.

The system is a consolidation of eight early railway companies, some of whose lines were built for competitive purposes; and worse, some purely as promoters' schemes where there was no justification for the construction. This resulted in a ridiculous duplication of track to the extent that in the uptown section of the city there are seventeen parallel tracks in fifteen blocks. Unfortunately, with the consolidation of companies which naturally came along, the miscellaneous trackage was never really assimilated into a practical monopoly system. Two track gages were permitted to remain and operation of all the lines was continued with consequent financial burden and inability to build extensions into growing sections where they were needed.

But this faulty layout of trackage and failure to correct is not all. A series of some seven receiverships and eleven reorganizations, with unscrupulous financial manipulations in almost every instance, have not only thoroughly disgusted the New Orleans people with the utility interests, but this distrust and antagonism have been intensified by the fact that the local people have usually been left holding the bag.

So it is not going to be easy for the new interests and new management that recently took hold to develop a good condition of public relations. But there is a splendid opportunity to make an efficient and soundly profitable property of the New Orleans railway and other utilities. The recent purchase was presumably made at a price well within the actual physical value, which should make possible the rehabilitation necessary without a capital burden exceeding the earning powers of the property. The new control and management are free from the disrepute attached to the company's history. Furthermore, the report just completed by John A. Beeler, while made for the city and containing recommendations that at first thought seem drastic, probably would, if carried out in major part, put the company in a position greatly to improve the measure with which it can fulfill the local transportation requirements. In fact, the plan of track rearrangements, covered in this issue, is one which the company might well have undertaken at its own instance. But it would provide much better service for the people as well as better economy for the company, hence its interest to the city authorities.

The time is now ripe for both company and public to make a new start, to work together in providing this great Southern seaport with the kind of transportation that it ought to have in order to keep pace with its opportunity to grow, and thus to eliminate one more of the sore spots of the traction industry.



Color Light Signals and Automatic Train Stops with Key Release on Frankford Elevated

Signaling on the Frankford Elevated—I

The Special Problems Met and How They Were Solved on This Most Recently Completed Elevated Line—This First of Two Articles Deals Particularly with the Signals, Trips, Electric Circuits and Air Lines

By J. N. Dodd

Consulting Engineer, New York City. Recently with the Department of City Transit, Philadelphia, Pa.

THE Frankford Elevated Railway* in Philadelphia is equipped with a complete automatic block-signal system. Some of the main features of the installation may perhaps be most clearly presented in tabular form. They comprise:

Junction interlocking.
Yard entrance and terminal interlocking.
Emergency crossover interlocking.
Semi-automatic control of interlocking signals.
Permissive signaling.
Three-position automatic block signaling.
Automatic stops.
Overlap control of signals.
Electro-pneumatic operation of stops and switches.
Traffic locking between towers.
Approach locking.
Time-release locking.
Sectional-route locking.
Speed control of signals.
Color-light-type signals.
Single-rail track circuits.
A.c. control entirely (no batteries).
Continuous-bus feed for all low-tension apparatus.
Loop system of high-tension mains.
Lever light indicators.
Illuminated track models.

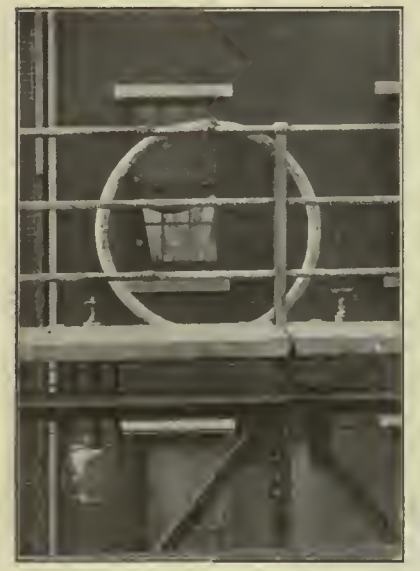
The signals are of the color light type, with a lens opening 5 in. in diameter. According to specifications they were to have a range of 1,000 ft. in bright sunlight. Actually the range is about 50 per cent in excess of this. Signals at station entrances and "dwarfs" are two-position and display red for "stop" and yellow for "proceed." All others are three-position and show red for "stop," yellow for "proceed with caution as the next signal is red," and green for "proceed." The lamps are 36-watt, 30-volt, and have two filaments in multiple. If either filament burns out the remaining one will give an indication, but the reduction in light warns the maintainer of trouble.

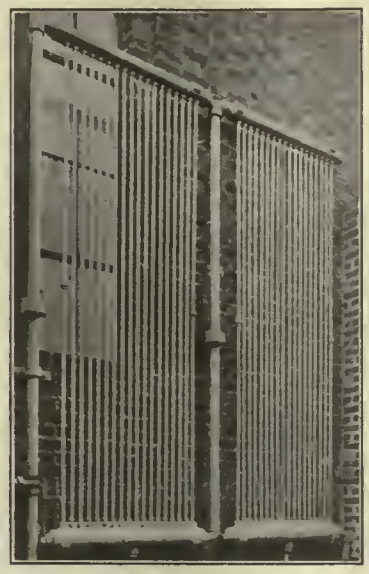
The light unit is a cast-iron box, mounted on a pipe post erected on top of the relay case. The case is carried on a special platform placed just outside of the bench walk running along each side of the structure for its entire length. To one side of the relay case is fastened a ladder to permit access to the light unit.

Trips Are Normally Depressed

On the track level near each signal is a stop or trip which serves to enforce the danger indication. When raised this is in position to engage with a valve in the brake pipe mounted on the car truck, thus setting the brakes on any car which passes. It is in the raised position only when the red signal is displayed. In general there are two types of circuits controlling trips which are normally in the depressed position. With one type the trip rises directly back of a train and does not fall until the signal changes to yellow. The train is thus protected by two raised trips back of it. The type of control adopted for most of the trips on the Frankford Line differs from this in that the raising of the trip is delayed until the train has left the block at the entrance to which the trip is located. As

*For details of the track and elevated structure of this railway, see ELECTRIC RAILWAY JOURNAL, Nov. 25, 1922, page 841.





At Left, Expansion Loop and Drainage Reservoir in Air Pipe Lines. At Right, Condenser for Removing Moisture from Air Pipe Lines

with the type of control previously described, the trip falls when the signal changes to yellow. The train is thus protected by one raised trip located a full block length back. The presence of a train on the section immediately beyond the trip holds the trip down. This type of circuit was adopted to permit the operation of trains in the reverse direction without the necessity of installing an additional relay at each signal to be operated by the traffic levers in the signal towers.

Relays for this purpose are objectionable on account of their cost, but mainly because they and the control circuits used for clearing stops would come into play only in emergency cases in which it is desired to reverse the direction of traffic. It would be difficult to test out such circuits during the normal operation of the system, as they would be very long and the relays could not be energized without interfering with the normal operation of the trips. If the trips should be disconnected from the relays to test out the relay control, the entire feature would be out of service until the trips were again connected. Because such circuits and relays would seldom be used, and because of the difficulty in testing it would probably often be found that, on account of broken wires or loose connections they were inoperative when needed. The scheme adopted insured that the circuits and relays used will come into play continuously during normal operation. The circuits are local at each station and are therefore much easier to test and maintain.

There is an interesting variation from this type of circuit in the control of the signal trip at the leaving ends of the stations. At these signals there is no overlap and the trip must rise directly back of a train. To avoid using the relays above referred to, the control is such that the trip never rises unless a train enters the approach section when the signal is red.

On the cars of the Market Street elevated line of the Philadelphia Rapid Transit Company, which run over the Frankford line, the valves installed to engage with the track trips are both at the same end instead of one being at each end as is usual. On that line the track trips are normally raised and fall only when a train approaches a proceed signal. Normally raised trips were found unsatisfactory in that a signal could be clear while through some fault the trip was raised and the motorman would find himself stopped without warning when passing a clear signal. Accordingly the Frankford specifications provided that the signals should be red whenever the trip is raised and that the trips should function correctly even when the valves on the cars are placed 38 ft. to the rear of the front wheels. This necessitated placing the insulating joint 38 ft. back of the signal trip. However the circuits adopted for the trips at the leaving ends of stations made it permissible to place this insulating joint close to the signal.

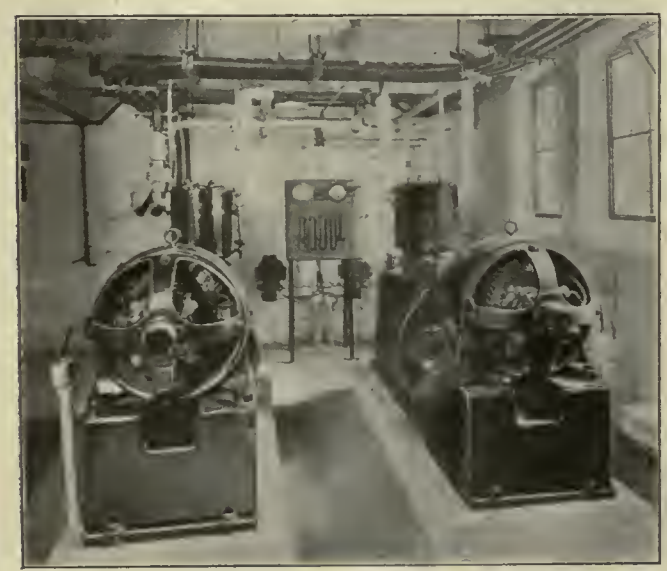
The trip is raised by a counterweight mounted in a box placed between the rails. The downward pull of the weight is opposed by air pressure in a cylinder. When there is loss of air pressure, or of the electric current controlling the valves, the weight at once raises the trip.

Motorman Can Depress Trip from Cab

The operating rules provide that a motorman arriving at a danger signal shall stop for a specified short period and shall then depress the trip and proceed under caution. To facilitate his doing so a control button for the trip is mounted on a special stand near the signal, where it can be easily reached from the cab window.

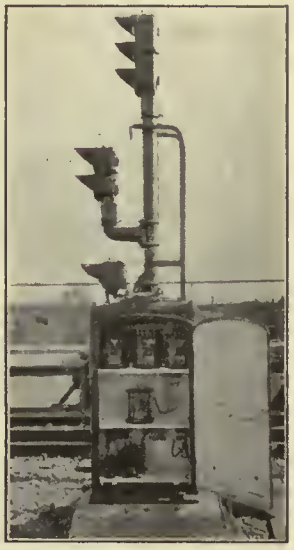
The provision of this control button is an interesting proof of the influence of the men under the Mitten management. When the plans for the new car were finished they were criticised by the men on the ground that there should be a door in the cab to give the motormen access to the station platform and to the bench walk. The men agreed that the main reason for such a door was to permit them to reach the track to depress a trip which was in the raised position. It was impracticable to provide such a door in the car, but instead the equipment just described was installed to allow them to depress the trip from the cab window. It is a feature which has been greatly appreciated by the men.

Affixed to each signal is a number, even or odd denoting respectively the east and west tracks. The num-



Pair of Motor-Driven Air Compressors in Substation





At Left, Another Color Light Signal with Train-Stop Key-Release Pedestal. In Center, "Close-Up" of Automatic Trip for Stopping Train When Signal Is Ignored. At Right, Vane Relay, Transformer and Reactor, Mounted in Case

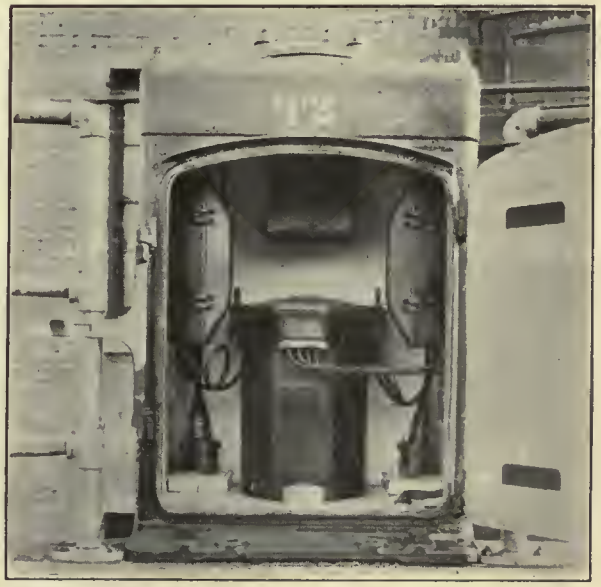
ber is chosen from the nearest house number on the street. In Philadelphia the house numbers increase by one hundred with every block and a slight knowledge of the city will enable one at once to locate a given house number. Thus signal No. 241 is on the west track near the beginning of block 24. Besides making it easy to determine the location of any signal, this system of numbering eliminates the awkwardness of giving new numbers when the signals are originally numbered seriatim.

Overlap protection is provided at all points, in length not less than the full braking distance required for a train running at the maximum speed attainable if it stops at all stations. With the following exceptions a train is guarded by two danger signals to its rear: A train standing at a station is protected by one danger signal located the full braking distance back. One which has just left the station is guarded only by the danger signal at the leaving end of the platform. The control of the signal at the station entrance is only to the signal at the leaving end and there is no overlap. However, a train which is stopped just after having left a station is protected by the fact that the following train makes the regular station stop and, if the train at the station should accelerate at the maximum rate, the maximum speed which it could attain when it has reached the trip is low and it would be brought to a standstill in a very short distance.

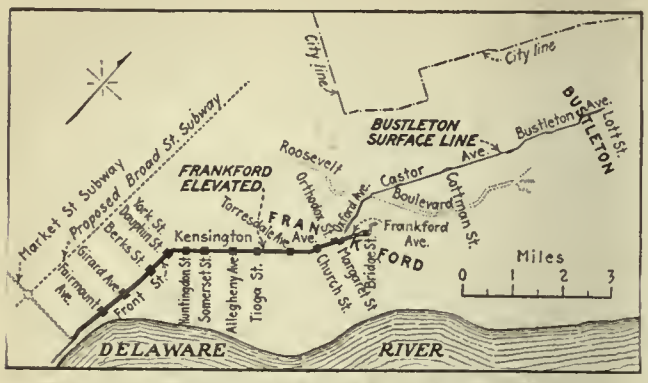
Track circuits are a.c., 60 cycles, and of the single-rail type. The rail next the center of the structure is reserved for the return of the propulsion current from the car motors to the substations, while the outside rail is reserved for the signals. Usually the outside rail is the farthest from the third rail, but it is kept for the signals regardless of the location of the third rail.

Relays are of the vane type. The ruggedness and simplicity of this type render it suitable for the vibrations and other severe conditions experienced on an elevated road. The relays are mounted on springs and enclosed in glass cases which permit an unobstructed view of the interior.

The track transformers are air-cooled and have two secondaries, one for the track circuits and the other for the lights. Each winding has several taps to permit

At Left, Steel Relay Cabinet and High-Tension Transformer in Substation. At Right, Transformer for Supplying Signal Current, Together with Fuse Boxes, Mounted in Cast-Iron Case



Map of Frankford Elevated Line in Philadelphia Showing Relation to Market Street Subway

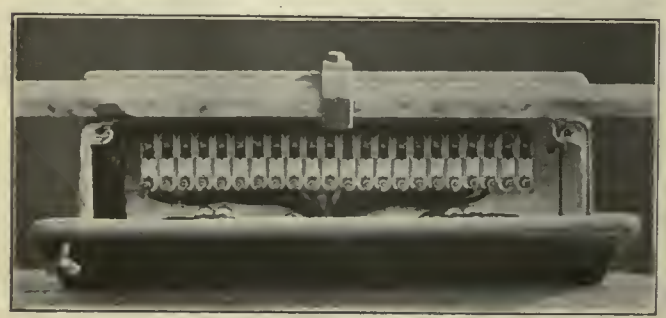
choice of voltages best suited for the conditions met. The insulating joints are Keystone. All other joints in the signal rail are bonded with a No. 2 A.W.G. stranded copper bond, flame-welded to the head of the rail. At each successive insulating joint the polarity of the track circuit is reversed. This permits immediate detection of defective insulating joints.

Novel Features in the Power Distribution

In the power layout some of the details are perhaps novel. All of the track transformers and other apparatus receiving power at 110 volts are fed from two mains of No. 6 copper running the length of the line. This size was chosen so that if any of the line transformers feeding the mains should burn out, or for any other reason go out of service, the voltage drop through the mains would not be sufficient to prevent any of the 110-volt apparatus from functioning even under the heaviest traffic that the signal spacing will permit.

At each of the line transformers one of the mains is sectionalized by a single-pole switch and fuse. At each of the emergency crossovers, which divide the line into four approximately equal parts, both of the mains are broken by a switch and fuse. Doubt had been expressed as to the feasibility of using continuous mains, so that the switches and fuses were installed to permit sectionalizing if necessary. Up to the present no serious trouble has developed and the mains have been maintained continuous from end to end. The use of continuous mains has been found very satisfactory.

The line transformers are 2,300/110-volt, and are placed at twenty-two different points along the line. At interlockings they are in duplicate. At some of the interlockings the capacity of each is 5 kva.; at all other points, 3 kva. The capacity was chosen such that in case any transformer should go out of service, those on either side would have enough spare capacity to carry the additional load without overheating. All of the transformers are fed through a loop feeder running from the substation to the several transformers and back. At each transformer this feeder is broken by two double-pole single-throw switches connected in series, and the transformer is connected between the two switches. By this arrangement, if any section of feeder should give trouble the switches connecting the section to the transformers on either side may be opened and full service obtained from the transformers through the remaining sections of the loop.



Terminal Board in Signal Circuits, in Case Hung from Walkway Railing

The low-tension wires, including the two mains above described, are assembled in a cable carried in a heavy galvanized steel conduit fastened to the outside ends of the angle irons supporting the bench walk. The cables vary in size from 5-conductor to 42-conductor. Each conductor has a braid over the rubber insulation and there is a double braid over the assembled wires. Braid over each conductor was specified rather than the tape permitted in the Railway Signal Association specifications because it does not untwist in the junction boxes. The taps from the mains across the tracks are 2-conductor cables and all other conductors across the tracks are single wires. Connections from lever machines to switches are 5-conductor cable.

Pull boxes are placed where necessary and in no case farther apart than 500 ft. Expansion joints are provided at junction boxes, transformer and relay cases, and at other suitable points. These are 15-in. nipples of steel pipe 1 in. greater in diameter than the conduit at that point. The end of the conduit is brought within the nipple and there is no screwed connection between the two. The diameter of the main conduits is 2 in., 2½ in. or 3 in., as required. The size at all points is such as to permit the installation of 25 per cent more wires than are installed at present. The use of a conduit on the structure for carrying the signal cable was adopted after its value had been demonstrated by eight years' uninterrupted service on the Market Street line. The high-tension feeder is a lead-covered cable carried in the underground duct line.

How Reliable Air Supply Is Assured

Compressed air is used for the operation of all track trips and switches on the Frankford Elevated. The air pipe is an extra-heavy galvanized-steel pipe 2 in. in diameter, carried in the same manner as the conduit for the cables but on the opposite side of the structure. Expansion is provided for by circular bends, about 3 ft. in diameter, placed not farther apart than 500 ft. At each bend is a 2-in. gate valve.

Drainage of the water which has condensed in the pipe was provided for by installing reservoirs at the bottoms of all slopes and at all expansion bends. These reservoirs are heavy conical castings about 8 in. across the greatest diameter and 10 in. high, supported with the apex downward. The reservoir is carried from the air pipe by a special hanger, as well as by the screwed connection. To remove from the reservoir the water which has collected, a ½-in. pipe is inserted to the bottom of the reservoir through the air pipe above it. The opening of a valve in the ½-in. pipe allows the air pressure to force out the water which has collected. Reservoirs are connected to the bottom of the pipe and all other connections are made at the top. Every 150 ft. connections are made for the use of air-operated track tampers.

Air is supplied from five compressors of a capacity of 110 cu.ft. each and one of a capacity of 35 cu.ft. These

six compressors are located two in each of the three substations which supply power for the road. One of the compressors in each substation is arranged to cut in at a pressure of 75 lb. and the other at 80 lb. Mounted near the compressors is a panel board equipped with an air gage, a voltmeter, a plug and receptacle for connecting the voltmeter to either machine, two d.p., s.t. switches for cutting out either compressor, and a d.p., d.t. switch for connecting either compressor to either governor and so throwing the main load on either machine. Up to the present time one compressor in a substation operating only a small part of the time has been found sufficient to supply the requirements. Excess compressor capacity was supplied to permit the use of compressed air for operation of track tampers and for blowing out snow from the track switches. The compressors are water-cooled, and each is driven by a direct-connected, 600-volt, compound-wound motor.

Fastened to the outside of each substation building is a condenser consisting of thirty-four ½-in. pipes 9 ft. long, arranged seventeen in multiple and two in series. The effectiveness of the condenser is shown by the fact that since they have been in operation no water has collected in any of the reservoirs along the line. From the substation to the line the pipe is carried underground, imbedded in 4 in. of concrete.

An article on the signal equipment of this road is not complete without some reference to the work of installation. The order was given on June 6, 1922. Location for the field office, lumber for the shed, and telephone were obtained on June 7. Tools were shipped on June 8 and arrived on June 13. The air pipe, the conduit, the insulating joints, half the trunking and half the signal cases arrived on July 1. The work was finished on Oct. 21, 110 working days after the order was placed. The maximum force was 125 men. The equipment included five interlockings with sixteen switches, seventy high signals, sixteen dwarfs, 7 miles of conduit, 7 miles of air pipe and 1,800,000 ft. of wire conductor. Such an installation constitutes something in the way of a record.

The contractor for the work was the Union Switch & Signal Company. The detail parts were designed and manufactured by this company, which did the entire work of installation.

Credit is due A. O. Smith, signal engineer Philadelphia Rapid Transit Company, who is responsible for many details of the design, and to E. Baxter and H. Fugitt, of the same company, who were inspectors on the installation work. Stephen Harris, of the Department of City Transit, also had a considerable share of responsibility in connection with the work.

In a later article the interlocking plants will be discussed and attention will also be given to the speed-control signals, which form one of the most interesting features of the installation.

How Trainmen Can Sell Transportation

THE Dallas Railway recently issued a pamphlet prepared by a committee of Dallas trainmen appointed to study the problems of selling transportation. The committee met several times and discussed methods to be followed as a starter for merchandising transportation and drafted the following suggestions:

CONDUCTORS ARE REQUESTED TO:

Smile always.

Be neat—soap and water are cheap, and a clean shave makes you feel fine.

Thank passengers for buying tickets from you—you appreciate making the sale.

Offer to direct strangers who board your car at the Union Station or elsewhere—this voluntary offer of assistance on your part will be appreciated.

Help children and old people at every opportunity—some one may have the opportunity of helping your children or your mother or father some time.

Never dispute a passenger's word—the passenger is always right. If a passenger says he just got off another car, even though his transfer is old, say, "I beg your pardon, it is all right." Or, if you think a passenger has not paid the right fare and call his attention to it, and he says that he did pay the right fare, then say, "I beg your pardon," and *smile*. When a passenger claims to have given the signal but was carried by, don't argue with the passenger, just say, "I beg your pardon, I did not hear your signal."

Be careful not to embarrass a passenger in calling attention to an old transfer, or any of those other things like putting feet on the seats or spitting on the floor. Be very careful that no one else hears you when calling passenger's attention to same.

Be careful not to give too many small coins in change. When this is necessary apologize for doing so—for instance, "I am sorry, but I am going to have to give you some small change."

Keep race signs properly adjusted. When necessary to move the sign be careful not to offend.

Signal car to move up to cross-walks on muddy streets. Do this cheerfully and with a smile on your face.

When a passenger asks you how you feel, tell him you are feeling "fine." He is not interested in your sickness.

When you have to wait for a passenger, don't slam the door like it made you mad—*smile*. It isn't worth while to render a service grudgingly.

In outlying districts where only one end is available for exit, conductors announce, "This end, please" or "The other end please," as the case may be.

Call all streets, transfer points and public buildings in a loud and distinct voice.

Pay special attention to short-distance riders in the downtown district.

Be courteous all the time.

Think about your work from the standpoint of the passenger—he is the man who pays the bills and the one to be pleased.

MOTORMEN ARE REQUESTED TO:

Smile.

Be neat—soap and water are cheap.

Direct strangers.

Assist children and old people off the front end whenever possible.

Make easy starts and stops—jerking your car makes the ride disagreeable for the passenger and also for the conductor.

Stop at cross-walks on muddy streets—move your car up if necessary.

Operate your car on schedule time.

Co-operate with your conductor and with motormen on other runs and on other lines.

Announce streets when the car is crowded.

Think about your work from the standpoint of the passenger—he is the man who pays the bill and the man to be pleased.

Pay special attention to short-distance riders in the downtown district.

Be courteous all the time.

REMEMBER:

Politeness will keep you out of more difficulties and bring you more smiles than anything else.

Courtesy oils the wheels of life—removes the squeaks, jars and chatters that go with every position.

Courtesy pleases the customer. Think a moment and you will remember the time when you walked an extra block to deal with a salesman who had shown you courtesy the last time you were in the store.

Courtesy makes every job more pleasant—every task more worth while.

Courtesy is to some extent a test of civilization. Savages show little consideration and few people feel at home among them.

Sweeping Changes Recommended in New Orleans

Report by John A. Beeler Recommends Extensive Relocation of Rail Lines, Rerouting of Cars, Suggests Scheme for Speeding Up and Amplifying Service and Relieving Traffic Congestion—Contemplates Expenditure of $2,500,000, but Saves $850,000 Annually

A COMPREHENSIVE report by John A. Beeler, consulting engineer, New York City, covering the physical plant and operation of the railway system of the New Orleans Public Service, Inc., has been presented to Paul H. Maloney, Commissioner of Public Utilities of New Orleans, La. The changes recommended are of a fundamental nature and of great importance to the people of New Orleans and to the local railway. It is probably a fair statement that the engineer's proposals contemplate the most extensive revision of the track layout and plan of operation that has ever been recommended by competent authority for any city in the country.

Of first importance is the recommendation to abandon 37.29 miles of present track which, it is claimed, is duplicate, and to add 34.04 miles of new track where it is needed. The two gages now existing are to be eliminated by changing 31.5 miles of standard gage track to the wide gage measure of 62.5 in. which prevails on 176.64 miles. In addition to these track changes, the five-track railway thoroughfare on Canal Street in the 1-mile section at the downtown end of the street is to be extensively rearranged and the single-track mileage reduced from 6.91 to 3.40, with elimination of 0.72 mile of curved track, forty-nine crossings and thirty-five switches with mates and frogs.

Saving in Route-Miles Results in Considerable Seat-Mile Increase

Tied up with this change in trackage is an extensive rerouting program, which for the various lines would reduce the average round-trip mileage from 9.03 to 8.34, and the average route mileage from 7.37 to 5.73. The number of cars required for the evening rush-hour service would be reduced from 434 to 391, the total car-hours per day from 4,925 to 4,361, the total car-miles per day from 44,539 to 43,402, and the average speed would be increased from 9.04 m.p.h. to 9.96 m.p.h. The total seat-miles would be increased from 1,720,132 to 1,935,968, and the total average passengers per seat in the maximum evening rush-hour at the maximum point on each line, summarized, would show the improvement from 1.47 to 1.17.

In addition to producing a material reduction in the number of car movements in the 1-mile maximum traffic section adjacent to the Mississippi River on Canal Street, the principal business thoroughfare, the number of car turning movements would be reduced from 433 to fifty, and the total interferences from 845 to 100.

Considerable rebuilding of present rolling stock, including provision for one-man operation on many of the smaller cars, and the use of trailers are also covered in the report. There are recommendations covering various other matters also, such as energy saving, cooperative plan for employees, the use of automatic electric switches, loading platforms and skip stops and an adequate transfer system. As the plan affects practically every line in the city, the sequence of executing the various parts of the plan is very important, and the report includes a recommended order in which to carry this out.

The Annual Savings in Three Years Will Cancel Initial Expenditure

The total cost to the railway to carry out the complete program would be about $2,500,000, and it is estimated that this would effect savings amounting to some $850,000 per year. Mr. Beeler states that to continue to operate the system as it now exists under present labor and material costs means ultimately either a reduction in the quality and quantity of service or an increase in the rate of fare. By contrast, the adoption of the plan presented makes it practicable ultimately to lower the fare, thus realizing the desires of the public and fulfilling the obligations of the reorganizer. He says further that while it is rash to attempt to prophesy in these days, nevertheless under the conditions cited in the report, a reduction in the rate of fare should be practicable about September, 1924, under a ten-year amortization plan for taking care of the cost, or about October, 1925, under a pay-as-you-go plan. This reduction would be to the extent of selling four rides for a quarter. It would mean sixteen rides for a dollar, as compared with the former maximum of twenty, which, it is pointed out, "is not a bad showing for the railway, considering all things."

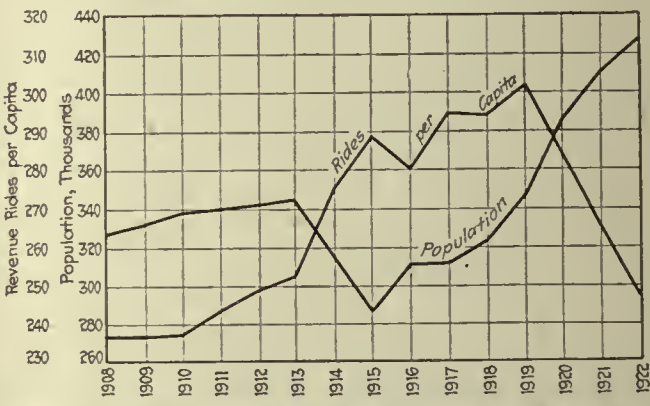


Fig. 1—Trend of Population and of Revenue Rides per Capita in New Orleans

A feature of the report, the engineer points out, is that the recommendations are not made with the sole idea of cheapening the cost of service. More efficient operations are made possible and various economies are recommended. The adoption of them in no case, however, does other than to improve the service. The principle upon which the whole plan is based is adequate service first.

Section I Covers Track Rearrangement

The report is divided into seven sections, dealing respectively with the proposed track layout, routing, a particular study of Canal Street, improvements in service, order of installation of the changes, a new transfer system, financial results. Altogether, the report comprises 233 typewritten pages, numerous exhibits being included.

In Section I the report states that the survey of the street car situation shows that the city is inadequately served. Two track gages with a multiplicity of crooked, indirect, interlocked routes, concentrating in the congested districts, greatly impair the efficiency and limit the flexibility of the system. Consequently the railway does not render satisfactory service to the territory it covers, nor does it give promise of a satisfactory expansion, such as is necessary to the growth and development of the community. A close study of the history of the railway indicates that much has been fundamentally wrong with it for years.

As demonstrating some of the fundamental weaknesses of the present railway system, the report then shows a comparison of the population growth of New Orleans with the rides per capita. While since 1908 the population has increased from 328,681 to 427,238 in 1922, and the number of revenue passengers has increased in the same period from 77,459,499 to 105,712,903, the number of revenue rides per capita has shown an upward but more recently a downward trend, having risen from 236 in 1908 to 312 in 1919, but dropping back to 247 in 1922. This comparison is illustrated in an accompanying curve. In explanation of this the report states that the higher rate of fare, and certainly the 8-cent fare which was put in effect on Oct. 23, 1920, has of course been a factor in reducing the riding habit, but this cannot entirely explain it, for the present rate of 7 cents (effective on Sept. 28, 1922) is not far from the old 5-cent rate, measured by the standard of wages now paid. The increased use of the passenger automobile undoubtedly has had its effect on the falling off of street car patronage, but the jitney, which has affected street railways so detrimentally in many other cities, is not a factor here.

Referring to the distribution of trackage, as laid at present, the report states that there is much that is

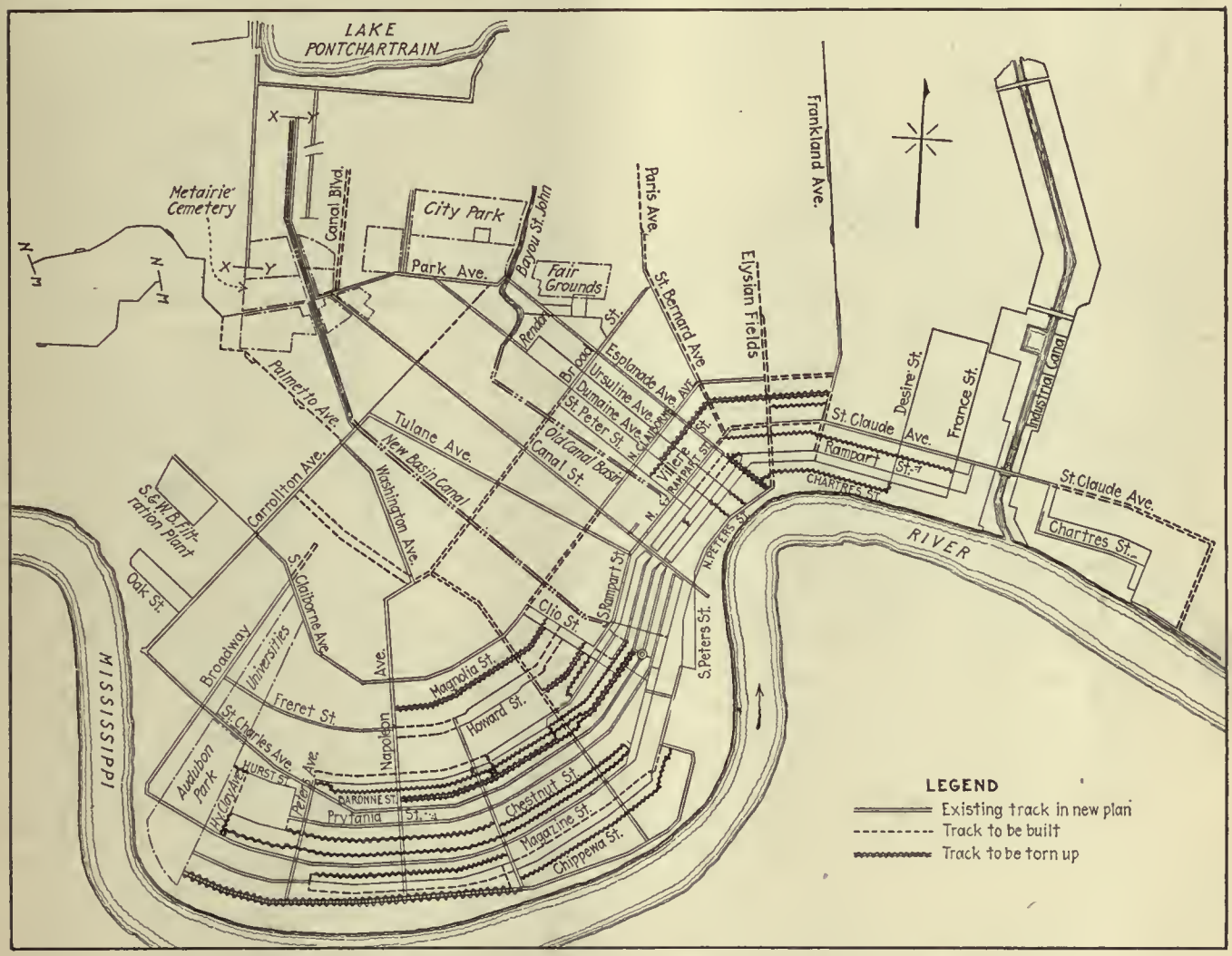


Fig. 2—Track Layout in New Orleans, Showing Present Track to Be Torn Up and New Track to Be Built Under Proposed Plan

radically wrong with it. Many miles of track were constructed not for the sole purpose of better serving the public, but because in days gone by franchises were sought and lines were built for immediate profit. Little, if any, thought was given to the future growth and requirements of the city.

An analysis of the distribution of track according to population is shown in Table I, which compares the "Inside District," bounded by Broadway, Claiborne, Lafayette and River, with the "Outside District,"



Fig. 3—Population Density Map of New Orleans Superimposed on Proposed Layout of Rail Lines

bounded by River, Broadway, Claiborne, Lafayette, River, Parish line, Florida Walk, Industrial Canal, Lake Pontchartrain and Parish line.

The inside district, representing less than one-fourth of the total area, has 60 per cent of the main-line trackage, while the outside district, covering more than three times the area, has but 40 per cent of the trackage. The inside district, with its concentrated population has but 1,680 people to the mile of track, while the outside district has 2,110. This impracticable distribution of track facilities has been the cause of misplaced service in one district and the witholding of needed facilities from the other.

TABLE I—ANALYSIS OF TRACK AND POPULATION DISTRIBUTION

	Inside District	Outside District
Area in square miles	9.1	32.1
Miles of main track	122.4	78.9
Population, 1920	206,081	166,426
Population per square mile	22,646	5,201
Population per mile main track	1,680	2,110

Such a condition is absolutely the reverse of what it should be. Densely populated, close-in districts should be served by trunk lines on frequent headways, while outside territory should be cared for by lines equitably spaced and adequately scheduled. The duplication of trackage is apparent in the uptown section between Rampart and the river, as shown in Fig. 2. For example, at Eighth Street, between Danneel and Tchoupitoulas, a distance of fifteen blocks, there are seventeen car tracks parallel to the river. Such duplication means excessive track maintenance and overhead costs and is largely the cause of infrequent headways and generally unsatisfactory service.

TABLE II—SERVICE PROVIDED AND FACTOR OF USE OF SERVICE

Year	Miles of Track Owned	Car-Miles Operated, Millions	Car-Miles Operated per Thousand Revenue Passengers	Car-Miles Track Operated Less Duplications	Revenue Rides per Capita per Mile of Track
1908	196.5	18.7	241	148	1.60
1909	197.7	18.7	238	149	1.59
1910	201.3	19.0	236	153	1.55
1911	206.9	19.3	233	158	1.54
1912	205.6	19.5	230	158	1.58
1913	205.6	19.8	228	158	1.60
1914	205.9	19.6	225	158	1.74
1915	217.4	19.4	233	169	1.70
1916	218.2	19.9	227	169	1.66
1917	218.5	20.1	217	170	1.74
1918	219.0	18.4	193	170	1.73
1919	222.1	19.0	176	171	1.83
1920	222.1	18.8	171	171	1.66
1921	222.1	18.6	170	171	1.55
1922	223.4	16.6	157	171	1.44

Figures compiled to indicate the service provided, Table II, show that the car-miles operated last year were less than in 1908, that the car-miles operated per thousand revenue passengers were only 167 in 1922 as against 241 in 1908, and that the revenue rides per capita per mile of track, based on the track mileage with duplications eliminated, were 1.44 in 1922 as against 1.60 in 1908 and a maximum of 1.83 in 1919.

It is pointed out that at present the only track connections between the uptown and downtown sections are by way of Lower Canal Street, forcing all traffic between these sections into the congested area. To permit a full normal growth of the city, through connections back of Rampart are necessary.

The plan proposed for relieving this situation and to provide a foundation upon which to build all the extensions required to care for the future growth of New Orleans, regardless of the direction or extent of such growth, is shown in Fig. 2. Unification of gage is one of the first requirements to afford greater flexibility of service. In even figures, the plan calls for the discontinuance of 37 miles of non-essential track, to be replaced by 34 miles. Of this latter, 9 miles are required for changes, such as double tracking, straightening out or otherwise improving existing lines. The remaining 25 miles are required for additions and new extensions. These changes are summarized in Table IV.

As a result of this relocation of track, the engineer states that service in territory now covered will be bettered, and extensions of service into sections now greatly in need of it will be provided. While the total track-miles will be slightly decreased, the effective main-line track will be increased from 171 miles to 205 miles. This will stimulate the growth of the city and increase the earnings of the railway. Fig. 3 shows a population density map of New Orleans superimposed on the proposed track layout.

On the matter of unification of track gages, the report notes that there is in the present track system 31.50 miles of standard gage (56.5 in.) track and 176.64 miles of wide gage (62.5 in.) track, or a total of 208.14 miles. Of this 3.04 miles is three-rail track, which is the equivalent of 1.52 track miles. The two track gages not only affect track, but apply to equipment as well, making it necessary to maintain two wheel gages on the rolling

TABLE III—ESTIMATED COST OF PROPOSED TRACKWORK

Unification of track gage	$232,350
Removal of non-essential tracks	295,260
Track required to permit route adjustments and track elimination	445,835
Double tracking existing single track	84,060
Extensions	917,665
	$1,975,170
Less aalvage	276,210
Net total cost	$1,698,960

stock. The cost and maintenance of the double-gage special work is, of course, much higher than single-gage would be. Owing to the preponderance of the wide gage, it should be adopted as the standard for the system.

In reference to this expenditure for track, the report states that as most of the track indicated for discontinuance is rapidly approaching a condition where it will have to be rebuilt, the major part of the expense of constructing new tracks will have to be incurred even though this plan is not accepted. The removing and placing of tracks where they are needed to improve the service will cost the company little if any more than to rebuild them in their present unsatisfactory location. The quicker these changes are made the better for all concerned. The cost may be spread over a period of years or paid for on the pay-as-you-go plan, which, with the adoption of the recommendations given in the report, will be largely out of savings made in cost of operation.

Civic Improvements

As a part of the track program the engineer took up certain needed civic improvements, including the widening of several streets and the opening up of several others to make through connections, recommended the straightening of two or three others and suggested that two new bridges were badly needed. He also pointed out that the neutral ground (center parkway) in some of the streets offers splendid opportunities for the installation of loading platforms, with their numerous advantages to the public and the railway. It is recommended that they be installed at all of the heavier loading points where practicable, especially at junctions where there is much transferring. The cost of the various civic improvements recommended was estimated at $310,130, which the engineer said should be divided between the city and the company, as may be determined by the parties interested.

Other sections of the report will be treated in succeeding issues of the JOURNAL.

TABLE IV—SUMMARY OF PROPOSED TRACK CHANGES

Old Line	Track Discontinued: Abandoned, Feet	Track Discontinued: Changed, Feet	Track Added: Changed, Feet	Track Added: Extensions, Feet	Proposed Line
.....	.....	.....	.....	2,700	Broadway
Canal Belt.....	.....	.....	.....	9,000	Canal Blvd.
.....	.....	.....	.....	4,200	Carondelet
City Park	1,700	.....	.....	.....	City Park
Desire.....	6,150	.....	600	.....	Desire
Peters Avenue..	.....	9,000	8,700	.....	Dryades
Dryades.....	2,700	.....	.....	.....	Dryadea
.....	.....	.....	.....	15,000	Elysian Flds.
Louisiana.....	.....	4,550	4,200	5,000	Freret
.....	.....	.....	.....	15,700	Jackson
Napoleon.....	.....	11,500	8,100	.....	Palmetto
.....	.....	.....	.....	11,200	Fig-Eden
Laurel.....	.....	18,200	17,900	.....	Laurel
.....	.....	.....	.....	350	Louisiana
.....	.....	.....	.....	18,600	Napoleon-Broad
N. Claiborne...	5,200	.....	.....	5,200	N. Claiborne
.....	.....	.....	1,500	2,500	Paris
Prytania	1,200	.....	.....	2,000	Prytania
.....	.....	.....	4,700	7,300	St. Bernard
St. Charles.....	1,200	1,445	1,885	.....	St. Charles
Shrewsbury.....	.....	.....	450	.....	Shrewsbury
Tchoupitoulas..	26,800	.....	1,000	600	Tchoupitoulas
Gentilly	.....	.....	.....	4,000	Gentilly
Dauphine.....	13,900	.....	.....	7,200	St. Claude
.....	.....	.....	.....	20,000	St. Claude-Friscoville
Bayou St. John .	4,700	.....	.....	.....	.....
Carondelet.....	21,650	.....	.....	.....	.....
Clio.....	14,400	.....	.....	.....	.....
Coliseum	32,650	.....	.....	.....	.....
N. Peters.....	3,800	.....	.....	.....	.....
Villere.....	16,200	.....	.....	.....	.....
Total.....	152,250	44,695	(a) 49,235	130,550	= feet
	28.83	8.46	9.32	24.72	= miles

Miles abandoned.....	28.83	Miles of extensions.....	24.72
Miles changed.....	8.46	Miles of changes.....	9.32
Total miles discontinued	37.29	Total miles added.....	34.04

These figures are exclusive of lower Canal Street changes.
Of the discontinued track, 19,900 feet or 3.77 miles is in paved streets and can be left in place indefinitely.
There is also approximately 16,050 feet of third rail track which is now carried as 1.52 miles of track operated; the change in gage will automatically wipe tbia out.
Note: (a) = Includes double tracking of aingle track.

Track Reconstruction in San Diego

Steel Tie Construction Used as Standard—Weather Conditions Permitted Work to Be Carried on Actively During Recent Months

DURING the past few months several interesting track reconstruction jobs have been done by the San Diego Electric Railway, notably the Adams Avenue and the University Avenue-East San Diego lines.

The Adams Street line is the one on which the track was torn up during the night last summer by the company's track forces as the climax of a long controversy between the city officials and the company over paving and other matters of dispute. After a court battle, a compromise was reached through the mediation of the State Railroad Commission, and reconstruction of the line was begun. The line will be double-tracked throughout its length to the end at Kensington Park, outside the city limits. Service was resumed on the line Dec. 23, 1922, although it was but partially completed at the time. This was a great relief to the patrons, who had been depending upon uncertain bus service, which could not be maintained in rainy weather because the adobe soil, used for roadway in the unpaved streets, is sticky and slippery when wet.



Reconstructed Track, Looking East from Park Boulevard. Track Is Ready for 2-In. Surfacing of Asphalt. Georgia Street Viaduct in the Foreground

The reconstruction work was carried out in accordance with the standards adopted by the company for all recent construction. The track construction comprises the use of twin steel ties, spaced 6 ft. center to center, with 93-lb. high T-rails for all straight track, 114-lb. rails for curves and 127-lb. guard rails for all special trackwork. All joints are electrically welded and the rails are electrically welded to the ties. All special trackwork is bonded with 350,000 circ.mil cable, and the welded tracks are cross-bonded every 500 ft. with cable of the same size.



Soft Spot in Adobe Soil, Filled In with Broken Concrete Preparatory to Laying of Track Structure



Electrically Welded Joint as Used in San Diego Electric Railway Standard Track Construction

The trench for the track is excavated approximately 18 in. deep. Two feet outside the outside rails a trench is excavated 12 in. below the sub-grade and in it is laid a 4-in. concrete drain tile. The trench is then filled with crushed and disintegrated granite to within 14 in. of the grade.

The rails are set on concrete pyramid-shaped piers spaced 12 ft. apart and are adjusted to exact grade by means of double cast-iron wedges placed between the rail bottom and the top of the piers. When they are finally adjusted the rails are firmly braced in place and a 14-in. layer of concrete is poured. The concrete is worked up against the under side of the head of the T-rail, but the balance of the concrete surface is left 2 in. below the street grade to allow for paving.

On Adams Avenue the company has been relieved of the paving obligation. The track is, therefore, being surfaced with disintegrated granite, a material which is plentiful locally, and which makes a good roadway.

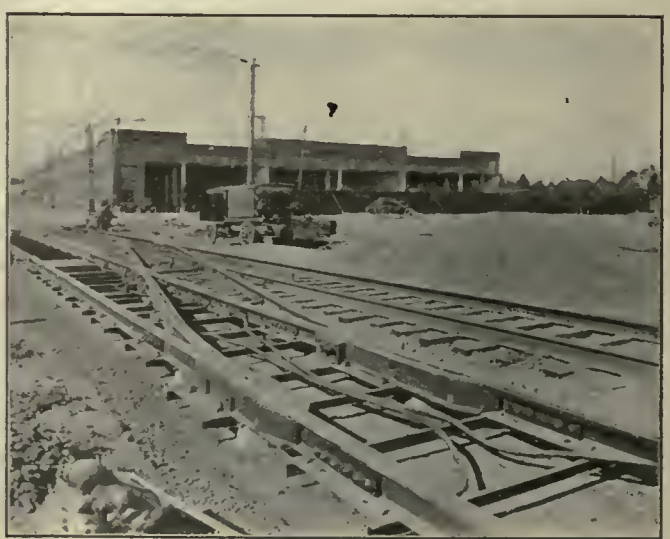
The reconstruction of the University Avenue-East San Diego line presented considerable difficulty due to the heavy traffic, the heaviest in the city, which it carries. The problem was solved by reconstructing one track at a time from Park Boulevard to the end of the line in East San Diego. A block signal system was installed to facilitate dispatching, and dispatchers with extra telephones were stationed at the turnouts where the eastbound and westbound cars are passed. Trains of two cars each were operated during the rush hours and a fourteen-minute headway was maintained, with extra tripper service added.

One of the special problems encountered by Engineer H. M. Kuehmsted, who was in charge of the work, was the caring for soft spots in the adobe soil. Generally these were caused by leaky water mains. The difficulty was overcome by excavating the soft soil until firm soil was reached and filling up to sub-grade with broken concrete.

The first work done by the San Diego Electric Railway under the new specifications was the reconstruction of the Broadway line from the Union Depot to Third Street, which was followed by the reconstruction of the Logan Avenue line, beginning last May. This work was described in the ELECTRIC RAILWAY JOURNAL at the time. Then came the Adams Avenue and University Avenue jobs, which will be followed by the construction of the Park Boulevard line, work on which is now due to begin. Then will come the new construction of the Sixteenth Street cutoff and the reconstruction of the Market Street line.



Track Reconstruction on Adams Avenue, San Diego, Showing Method of Supporting Track Previous to Pouring of Concrete



New and Old Track Construction on Adams Avenue, Showing Special Trackwork Near Carhouse

Merit System Works Well in Los Angeles

In This System a Bonus Is Given for Good Records, and in 1922 Nearly $95,000 Was Distributed as Bonuses and Special Prizes Among the Trainmen—Methods of Keeping Records Are Described

By J. G. Jeffery
Director of Public Relations, Los Angeles Railway

THE random remark of a trainman that "as long as the fellows do the right thing, they're practically working without a boss" may serve as the keynote for a discussion of the merit and bonus system followed by the Los Angeles (Calif.) Railway for the past three years. The remark was overheard by a passenger who was sufficiently impressed to communicate with the general manager and, as a result, the saying has become a part of the system.

Let it not be presumed that the system followed by the Los Angeles Railway is developing a race of supermen in courtesy and efficiency, for the Southern California company faces most of the problems which confront other railways except that there is no union domination. It has the same wish as every other company to promote courtesy, safety and general efficiency, the same general type of men on the cars and the same problems in "selling" the trainmen on the right company spirit.

George Baker Anderson, manager of transportation, is the father of the Los Angeles Railway merit system. He has developed his plan into an effective force for improving service by increasing the general standard of efficiency of trainmen.

Perhaps the outstanding feature of the system is that a trainman "makes or breaks" himself.

He goes through the employment and instruction departments and receives the same training as other trainmen. If he is courteous, accurate and safe, he will build up an efficiency record that brings him a cash bonus of $5 a month or $60 paid at Christmas and puts him in line for an additional cash prize. If he is discourteous and careless, he soon lowers his record to the point of only 75 per cent efficiency, and that is automatic dismissal.

When a new trainman enters the company's employ he serves a probationary period of three months. Then he starts an efficiency record with a rating of 100 per cent. He does not participate in the cash bonus until he has been in service six months.

A trainman receives demerits for such offenses as discourtesy, derailments, running ahead of time, negligence at fare box and untidy appearance. A regular schedule of demerits is prepared governing the most common offenses. The demerits range from five to dismissal from service. Each five demerits or credits count as 1 per cent.

Credits are given for accuracy in reports, suggestions for betterment of service, special attention to students and reports of particular courtesy and safe operation. If a trainman goes through a month without marks against his courtesy and safety record he receives 10 credits for each, or an increased efficiency rating of 4 per cent. It will be noted that if a trainman merely follows an even course, keeping clear of demerits but not being reported for any special acts of efficiency, his record will build up month by month because it has been clear in safety and courtesy. If a man is off duty more than half a month he does not receive extra credits.

The office records are balanced monthly. Each 1 per cent below 100 per cent means a reduction of 25 cents from the month's bonus. A trainman whose record stood at 96 per cent at the end of the month would be credited with $4. A record of 85 per cent would mean only $1.25 bonus, and a balance of only 80 per cent would mean no bonus for that month.

The efficiency records date from Nov. 30 to Nov. 30, and the bonus is paid on Dec. 15, so that trainmen may have the benefit of the money before Christmas. In addition to the $60 regular bonus, special prizes were awarded in the past two years to some of the "top-notchers" of the five carhouse divisions. Extra prize money ranging from $10 to $100 was received by the ten top motormen and ten top conductors of each division and by the ten top safety car operators. The regular monthly bonus in 1922 totaled $91,011.51 and the

MATTER PRINTED ON UPPER PART OF RECORD CARD

CAUSES FOR CREDITS

(Each five credits to count 1 per cent on record)

1. Accurate daily reports	5
2. Clear record for one month for courtesy and safety (10 credits each)	20
3. Exceptional act to prevent accident or injury	50
4. Practical suggestion as to betterment of service	5 to 15
5. Reported dangerous conditions and practices	10 to 30
6. Special care in preparation of accident reports	10 to 30
7. Special attention to students	10
8. Miscellaneous	5 to 50

CAUSES FOR DEMERITS

(Each five demerits to count 1 per cent off record. Demerits are charged only when the trainman is considered to be at fault)

1. Discourtesy to passengers	10 to 50
2. Collision of cars; collision with vehicle or person	10 to Dis.
3. Injury to passengers on car	10 to 30
4. Step accident	20
5. Derailments and split switches	10 to 30
6. Ejectments, disturbances and disputes	10 to 30
7. Carrying passengers past destination	10 to 20
8. Passing up passengers	10 to 20
9. Failure to report accident	50
10. Starting or backing up without signal	40
11. Excessive speed	40
12. Running ahead of time	10 to 50
13. Failure to make prompt report of day's receipts	10
14. Failure to collect fares	10 to 50
15. Negligence in operation of fare boxes	10 to 30
16. Failure to account for fares collected	50 or Dis.
17. Failure to turn in lost articles promptly	5 to 20
18. Failure to report condition of cars	10 to 40
19. Failure to make safety stop	50
20. Failure to observe danger signals	50
21. Failure to observe crossing rules	5 to 30
22. Improper operation of block lights	25 to 50
23. Laxity in calling streets	5 to 20
24. Leaving car unattended	10 to 30
25. Leaving terminus ahead of schedule	10 to 50
26. Missed relief	10 to 30
27. Oversleep	10 to 50
28. Absence from duty without permission	50 or Dis.
29. Absent account of sickness without notifying office	5 to 30
30. Permitting money to accumulate on inspection plate	5 to 30
31. Violating road space	10 to 30
32. Smoking while on car	10 to 25
33. Committing nuisance	10 to 50
34. Untidy appearance	10
35. Visiting with motorman while car is in motion	10 to 30
36. Improper feeding controller	10 to 30
37. Wasting power	10 to 30
38. Miscellaneous	5 to 50

special prizes were $3,905, making a grand total of $94,916.51. Checks were given to 1,830 trainmen. On Nov. 30 last, when the records for the year closed, 2,369 trainmen were in service.

In picking the 110 men for special prizes, the officials considered general attitude of a man toward his job, willingness to help in an emergency, and other factors that do not necessarily show in percentages on a trainman's record.

How the Records Are Kept

The majority of reports for credits and demerits come from company operators riding the cars to observe service conditions and from supervisors. Various departments, such as the safety bureau, frequently recommend credits or demerits in cases coming to their attention, and a goodly number of credits are given on reports made by the trainmen themselves.

The recommendations for credits and demerits are first passed upon by the transportation department officials. They are then given to the clerks who enter the marks on the record cards. There is a card for each employee. It is 8 in. x 11 in. and is known as his "Efficiency Record." The upper part of a typical card of this kind, to indicate the way in which the records are kept, is reproduced on page 721.

Notification of Credits

Div. No..... Date.....
To..... Cap No.....

It is a pleasure to advise that you have been awarded .....credits under Classification shown here below, as per list of Causes for Credits and Demerits posted at your Division. Should you desire further information as to the report upon which this action is based, you may obtain it by consulting your Division Superintendent.

Classification No.....Date Occurred.....
Place .....
.....

The award of these credits places your Efficiency Record at.....%.

.....
Supt. of Operation.

The Efficiency Record Is Kept on a Card, and Each Trainman Is Advised of Any Change in His Efficiency Record

With every entry of credit or demerit a notification slip is sent to the trainman affected. The slip for credit is printed on pink paper, with the wording as printed above.

The notification slip for demerits is printed on green paper and is very similar to that for credits except that the body of this reads: "This is to advise you that .....demerits have been placed against your record under classifications shown here below, as per list of causes for credit and demerit posted at your division. Should you desire further information as to the report upon which this action is based, you may obtain it by consulting your division superintendent." The company also uses a yellow notification slip called "Notification of Cancellation of Demerit." This reads: "This is to advise you that demerits assessed against your record under date of ....., Classification No. ..... have been canceled. The cancellation of demerits places your efficiency at..... per cent."

Duplicate record cars are kept at each division. The division superintendent may administer demerits for certain offenses such as missing out or being absent without leave. Having duplicate record cards enables him to impose demerits in keeping with the offense. Repeated offenses draw heavier demerits than first offenses.

A trainman has the privilege of appealing demerits to the assistant superintendent of operation, the superintendent of operation, the manager of transportation and even to the general manager.

System Started Three Years Ago

The merit and bonus system was established by the Los Angeles Railway on April 1, 1920, at a time when industrial conditions were upset with the after-war adjustment of business. There was considerable skepticism among some of the men who prophesied that the demerits would always exceed credits and that little bonus money would actually be paid. What little prejudice remained at the end of 1920, was dispelled when bonus payment for the eight months equalled a total of $58,605.75.

New trainmen are told about the details of the merit and bonus system when they apply for employment. It is presented to them solely in the light of special reward for special endeavor and not as a Christmas present. It becomes a business proposition to bring out the best that is in a man. To the company it is an investment in good service which pays big returns.

As stated in the first place, the Los Angeles Railway does not claim to be developing supermen of the street railway industry, but it has raised the standard of morale and efficiency of all to a point conceded by all in authority to be the highest in the history of the company.

Berlin Rapid Transit Conditions

THE total railway traffic in Berlin in 1918 amounted to about 1,570,000,000 passengers, divided among the city's own surface lines, the privately owned elevated and subway, and the Stadtbahn and Ringbahn, owned by the state. Of this number of passengers, 1,056,000,000 used the surface lines, 117,000,000 the subway and elevated lines and 395,000,000 the government-owned Stadtbahn. Today these figures have changed entirely. Stadtbahn passengers now number about 746,000,000 a year, while only 520,000,000 ride on surface cars, and the traffic on the subway and elevated lines has remained almost stationary. This 80 per cent increase in the traffic of the state-operated steam trains, which supply a sort of rapid transit service on an elevated structure or in open cuts in Berlin, results in a very dangerous crowding on the platforms and trains.

This great change in the distribution of travel is due to the fact that these government lines have not increased their fares to anywhere near the extent of the local lines. In consequence they charge a very low fare, which is made possible by a considerable subsidy from the Prussian Government. The street railway system, on the other hand, is operated by the city and is passing through strenuous times in the effort to become self-supporting. To reduce expenses the headways have been greatly lengethened, much unprofitable night service has been cut out and one-man operation has been introduced to a considerable extent. At the same time fares have been increased until, in February, 1923, the single fare was 200 marks, with 100 marks extra for a transfer. This, at the pre-war rate of exchange, would be equivalent to $50 for a single ride with $25 extra for a transfer.

New Shops for Toronto

More than $2,000,000 Is Being Spent on Shops, Office Building and Storehouse for the Toronto Street Railway System—Full Particulars of the Shop Layout Are Given

ONE of the important improvements under way by the Toronto Transportation Commission for the Toronto Street Railway is the erection of new repair shops.

Before the road was taken over from the Toronto Railway Company in 1921 it was evident that new shops would be required in the very near future. The buildings which housed the repair work of the system were so dilapidated physically, so antiquated in their layout and so inadequate in size that they were obviously of little or no value to the combined and enlarged system, operating with the larger and newer type of rolling stock. It was only natural that the company whose franchise was expiring should not make any improvement in the shops when it had only a short time to enjoy the advantages of it. This condition, however, made the erection of new shops the more imperative when the property was once taken over.

The old shops and stores, which are still in use pending the completion of the new buildings, comprise four main units, namely: (1) A one-story building containing the truck and motor shop, the blacksmith shop, the machine shop, the brass foundry, the armature shop and the electrical shop; (2) a three-story building, located a block away, for car body repairs, with an elevator to raise the bodies from floor to floor; (3) a storehouse, and (4) a paint shop, which is located 2½ miles from the other units.

Site and Arrangement of New Shop

The new shops are located fairly centrally to the system and will be more so as the city expands. The site is at the corner of Bathurst Street and Davenport Road and was without buildings when purchased. It measures 930 ft. by about 950 ft. and contains 22.24 acres. It is served by a railroad siding. Besides the shop, a storehouse will be erected on this plot to serve both the Toronto Street Railway system and the Toronto Hydro-Electric system, with a view to economy in both capital and operating accounts.

The shop layout comprises a main building which includes all shops concerned with the repair of the cars. The area of the main building is 186,560 sq.ft., which is equivalent to approximately 156 sq.ft. per car, based on a 1,200-car system. A general stores building, an office building, a boiler house, a coal and ash handling plant, a garage and various subsidiary buildings such as oil stores, scrap bins, etc., are also provided for.

The single-unit plan, as adopted for the main building, includes the following departments: (a) Woodworking shop, (b) erecting shop, (c) paint shop, (d) car painting shop, (e) truck shop, (f) motor shop, (g) forge shop, (h) machine shop, (i) armature shop, and (j) a controlling department, called "free stores."

The main building as designed is a one-story structure with a steel frame and brick walls. The roof is of precast gypsum and is of the sawtooth type with fixed monitor sash giving a north light. The floors are of concrete, wood block or mastic, as is most appropriate, and the inspection pits are of concrete framed on steel columns and beams. The heating is an indirect hot air system except in the paint shop, where direct radiation is provided. A complete system of automatic sprinklers is provided throughout the building and a system of fire hydrants throughout the adjacent yard. As an auxiliary supply for fire purposes, a 100,000-gal. tank is to be built.

The main building is divided by a covered transfer table runway to facilitate the moving of cars, and the general working of the shop may be classified under the following headings: (1) Repair and overhaul of rolling stock, (2) repair and overhaul of parts and materials received from the operating divisions, (3) manufacture and assembly of car and truck material for stock and (4) miscellaneous orders for departments other than the rolling stock department.

Routing of Work

The general routing of the work, considered under the headings mentioned above, is as follows:

A car for general overhaul enters the shop at the south door at the west end of the transfer table runway and is moved to the west set of car hoists in the erecting shop. Temporary trucks replace the permanent trucks, which are removed and transferred to tracks in the truck and motor shop for overhaul. Motors are removed and sent to the armature shop. The car body is then sent to the erecting shop for body overhaul, thence to the washbay and car paint shop, and thence to a car hoist at the east end of the motor shop. The rebuilt trucks then replace the temporary trucks, which are returned to one of the tracks in the erecting shop. The car then goes to the paint shop, where the trucks are painted, and then via the transfer table to the west end of the shop and out by way of the north door. If cars are sent to the shop for accident repairs the routine described is varied according to the damage.

The second division of the work mentioned above is the repair of parts. Materials and parts from divisions for repair will be received in the "free stores" department, where they will be registered and tagged for the shop. The parts and material are then sent to the proper department as work on the machines permits. When finished, the part is returned to the "free stores" and sent back to the division or to the general stores building as directed.

Requisitions or orders for new work for stock are sent through the "free stores," and materials on these orders are sent out through the "free stores." Under this part of the work comes the ordering of parts from one department to another. These orders and the finished article will be handled through the "free stores."

The employees' entrance is at the east end of the building south of the transfer table runway and is under control from the watchman's room opposite. Adjacent to this entrance is the lunch room. Banks of wash basins are located at the east end of the locker rooms, and the toilets are located on galleries above. A section at the extreme east of the shop is provided for buses.

The boiler house will be located just west of the main

building and will be of brick with a steel frame. It is connected to the main building and the general stores building and office by a tunnel through which the steam pipes will be conducted for the heating of all buildings.

The general stores building will be a reinforced concrete structure of flat slab type with brick walls and steel sash. It will be sprinklered throughout and will be heated by steam pipes brought from the main boiler house through the tunnel mentioned. At present this building will be three stories in height, with a basement, but the foundations will be ample to carry four additional stories when required. The total floor area in the general stores building, as designed, is 132,600 sq.ft.

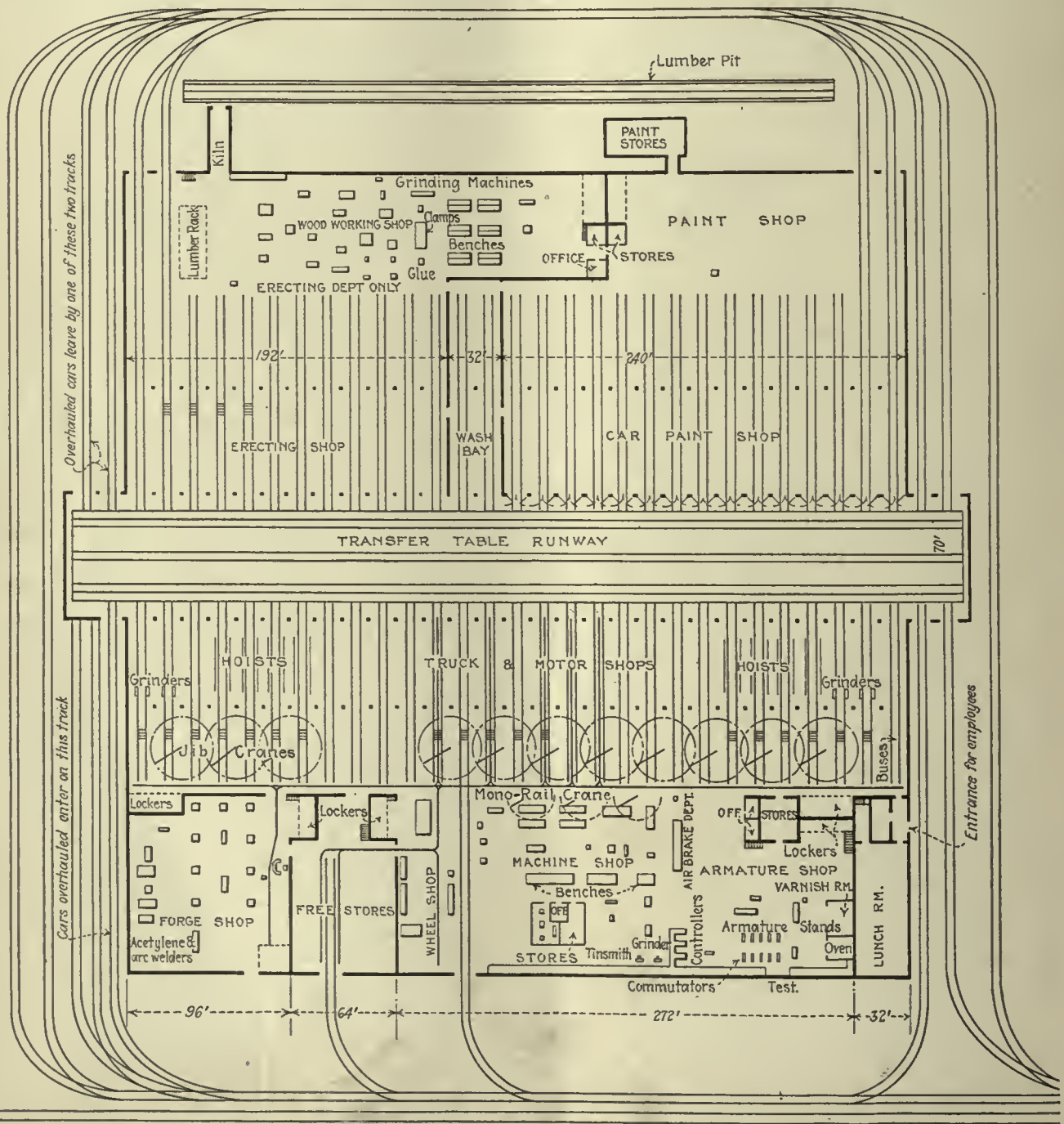
The office building will accommodate the superintendent of rolling stock and his staff and will include a first aid room and an employment office. It will be a two-story brick building with steel frame and wood floors and will be located just north of the main entrance to the property.

The estimated cost of the project, excluding land, is as follows:

Buildings	$1,660,000
Trackwork and overhead	220,000
Equipment	200,000
	$2,080,000

The work of construction has been begun and it is estimated that the shops will be completed and in service before the end of the present year.

Before deciding on the present plan the commission's engineers made an extensive study of various shop layouts and visited the shops in Cleveland, Montreal and Detroit. A general plan, as developed by Jackson & Moreland in connection with the city's case in the arbitration proceedings for the purchase of the Toronto Railway, was also made available to the commission, and the services of C. A. Remilius were utilized in connection with the general layout and equipment.



General Plan of New Repair Shops, Toronto Street Railway, Now Under Construction

Pulverized Fuel Plant at Providence

The United Electric Railways Is Making Power Plant Improvements to Cost Upward of a Million Dollars—New Boilers Equipped to Burn Pulverized Coal Are Being Installed in One-Half of the Boiler House

THE United Electric Railways, Providence, R. I., operates all electric railway lines in Providence, Pawtucket, Bristol, Woonsocket, Warren and more than fifteen other municipalities. Since the reorganization of the property in July, 1921, following a receivership, many improvements have been inaugurated, to cost ultimately several million dollars. A fair share of the amount will be spent on the company's power system, which is taxed to supply the constantly increasing demand for power. The company supplies at present approximately 95 per cent of the power used for its railways and will, on completion of certain extensions to its system now in progress, supply over 99 per cent. The net energy production for 1923 will amount to about 70,000,000 kw.-hr.

The company's power plant is located in Providence. It will have a capacity of 50,500 kw. after improvements now under way are completed. The plant was excellent for its day, but was outgrown both as to capacity and style of equipment. When the situation was explained to the directors, who through their committee on power matters keep in close touch with details in this department, they unanimously approved a comprehensive plan of rehabilitation involving the scrapping of $600,000 worth of obsolete apparatus, representing 8,000 kw. of capacity, and the expenditure of more than $1,100,000 for new. Work now under way and planned for 1923 construction on transmission and distribution lines, substations and signals will bring this total to nearly $1,750,000.

The superseded equipment included four old engine units, two of 1,500-kw. capacity with alternating-current generators and two of 2,500-kw. capacity with direct-current generators, together with piping and auxiliaries of various kinds; also 2,080 hp. of B. & W. boilers having cast-iron headers. These boilers comprised one-quarter of the sixteen 520-hp. units which made up the boiler plant and which were arranged in batteries of two on two decks.

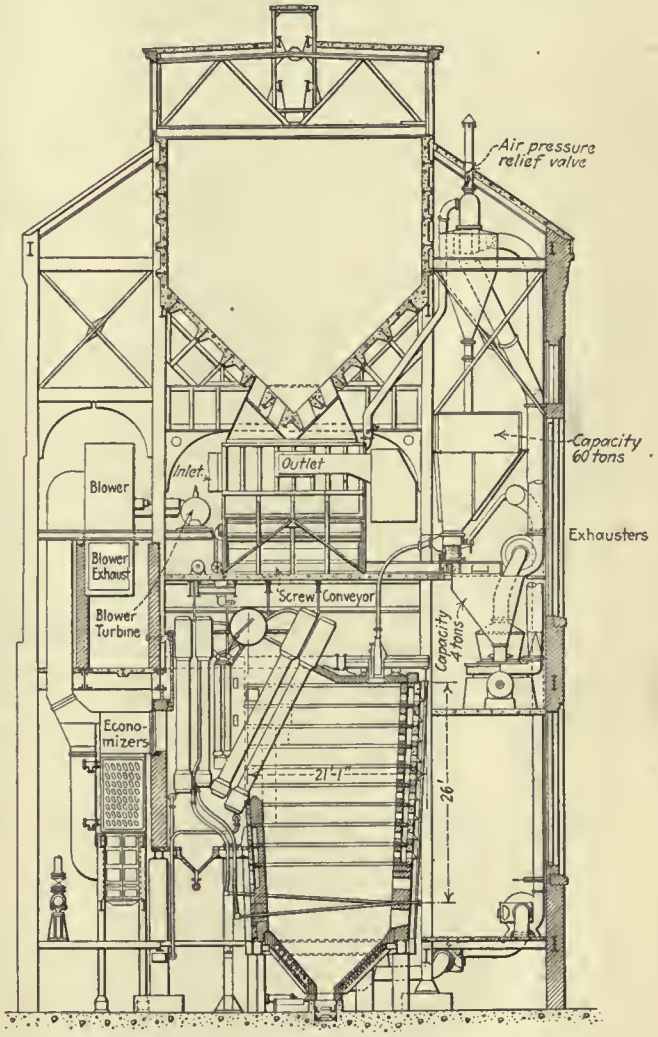
The improvements consist of the installation of an 18,000-kw. turbine unit with auxiliaries, three new boilers with auxiliaries, equipped to burn pulverized coal, together with numerous changes in the layout, including the provision of a machine shop in the power plant building, all of which will be covered in a later article.

Why Certain Detail Selections Were Made

The plant, as remodeled, has been laid out to secure the best results as regards both capacity and economy with the coal now used, namely, good bituminous coal of 14,000 B.t.u. heating value. At the same time the furnace design was so arranged as to permit burning, with more or less reduced capacity and economy, poor grades of fuel, including even anthracite if found economical. Provision has also been made for burning oil in the same furnaces.

A pressure of 300 lb. at the turbine was selected in order to secure the thermal benefits of reasonably high pressure without incurring excessive cost of the turbine and of high-pressure auxiliaries and pipe fittings.

With the boilers selected it will be possible to go to 325 lb., and the regular operating pressure of the boilers will probably be from 315 to 320 lb., allowing for pressure drop between steam drum and turbine throttle.



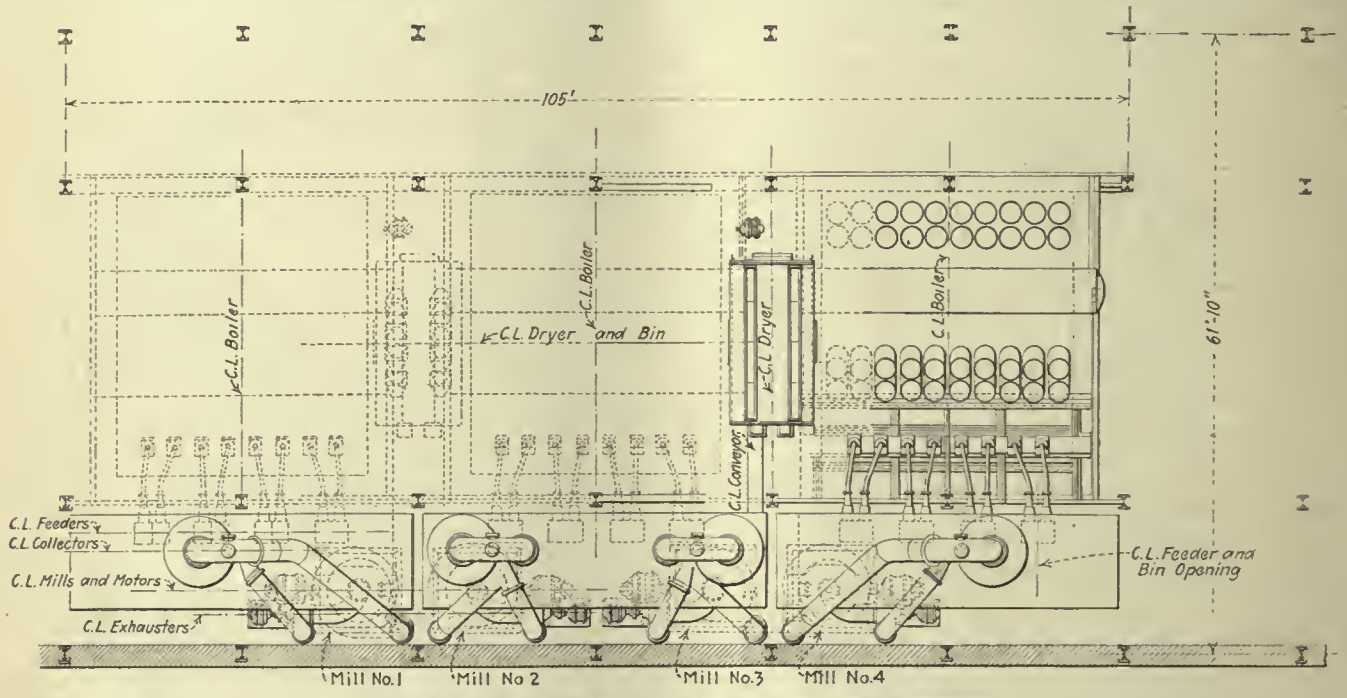
Vertical Section of the Boiler Plant, Simplified to Show Essential Elements

With the pressure determined, a superheat of 175 deg. followed naturally because a total temperature of about 600 deg. was thought the maximum desirable to assure as large a degree of freedom as possible from plant maintenance trouble and expense, although in actual operation the temperature may go somewhat above this at the high rating possible with the furnace design selected. It will, however, even in extreme cases, be well below what is considered the outside limit of 700 deg.

One of the ruling considerations in the new boiler layout was the shape of the boiler house and the location of the building columns. A vertical or upright

type of boiler was selected because it fits conveniently into the building and also lends itself well to the provision of the necessary large combustion space for the burning of pulverized fuel. It was impossible to use any large single-set horizontal-tube boiler of about the same horsepower because of building-steel interferences.

The preference was for singly set boilers to avoid the middle wall required with the battery arrangement, and because it was desired to have them accessible all around. The objection to the middle wall is the difficulty of cooling the refractory satisfactorily at high ratings. With the single setting, provision has been made for cooling of the walls with air. As large a boiler as possible was selected that would still leave reasonably ample passage space between units. Bigelow-Hornsby 1,266-hp. boilers, approximately double the size of the Bigelow-Hornsby boilers installed in 1914, were selected. Three of these boilers are being installed now and provision has been made for a fourth.



Plan Designed Particularly to Show Pulverized-Coal Equipment

Boiler Walls Well Ventilated

The boilers are hung from steel girders mounted between the building columns. Where necessary these were reinforced at the bottom with a heavy concrete envelope cast integral with the floor mat. The boiler walls are of steel plate lined first with "silocel" brick carried on horizontal structural steel H-sections attached to the sheet steel about 2 ft. apart. The refractory lining is mounted, a short distance away, inside the wall, to which it is attached by special firebrick shapes and iron clamps supported by the H-sections. Horizontal courses of these special shapes at the levels of the H-sections form air ducts which lead from the back of the bridge wall and from the sides of the boiler to the front, where they discharge into the combustion space.

Between the front and rear sections of the boiler a Foster superheater is mounted. This is connected with the steam drum in such a way that the steam enters at the back of the superheater, giving rise to the term "counter-current" superheater. Thus the cooler steam is in contact with the cooler gases and a greater heat absorption in the superheater results.

A Foster steel-tube economizer, having a heating surface two-thirds that of the boiler, is mounted directly back of each boiler, taking out the gases at a point about midway of the boiler height.

Near the bottom of the combustion space is a water screen divided into sections, each section connected at one end with the top and the other end with the bottom unit drum of the third row of unit sections of the boiler. This serves to precipitate part of the dust, preventing the formation of slag, while absorbing some heat of combustion. Below the water screen are hoppers from which the deposited ash dust will be removed through power-operated gates into a scraper conveyor moving in a trench filled with water. At the rear of the boiler smaller hoppers are provided to catch dust that gets through the boiler tubes.

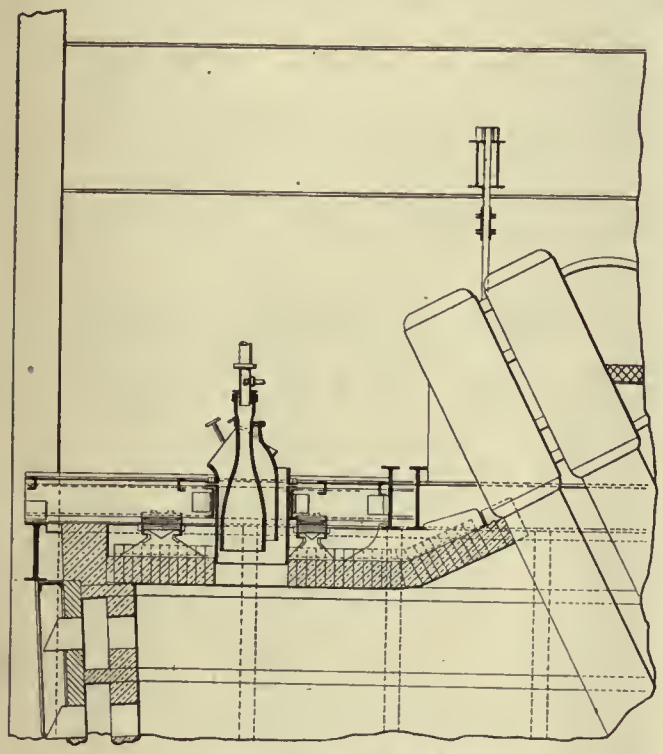
The Lopulco system of pulverized coal burning is being installed in accordance with an arrangement mutually devised by the engineers of the Combustion Engineering Corporation and the United Electric Railways.

The boiler house, having been built high on account of the previous double-deck boiler arrangements, provided sufficient space for installing the entire equipment inside the main boiler-plant building. The original reinforced concrete bunker built close under the roof was retained but was divided by partitions into three sections in which different kinds of coal can be stored if desired, thus allowing the making of predetermined mixtures at will as the coal is passed by gravity from the bunker through chutes to the driers, of which two are now being installed. One drier is over and between boilers 1 and 2, the other between boilers 2 and 3, and a third will be added when boiler 4 is installed. Through the driers will be drawn some of the flue gases after leaving the economizers.

From each drier the fuel will be fed to a pair of pulverizers, which are Raymond mills, from which it will be lifted by an exhaust fan to cyclone separators

high above. There are four mills now going in and there is sufficient space for two more mills if required. By a system of cross-connection pipes between separators and pulverized coal bins two separators will discharge into two bins and two into three bins by gravity. From each separator a pipe leads to one or the other of the two coal driers to permit removal of excess air from the separator systems. The air ultimately will find its way to the main stack through the fans which draw the flue gases through the driers.

From the separators the fuel will fall into bunkers of about 60 tons capacity each from which feeders, driven by Reeves variable-speed motor drives, will convey the coal through pipes to the burners. There are



Cross-section of Burner and Mounting

four double feeders to each boiler, each feeding two burners. Air for the feeders will be supplied from fans installed near the main floor level and drawing their supply from a duct so located as to draw cooling air through air spaces in the hopper bottoms.

Draft for the furnaces will be furnished by a brick stack 312 ft. high by 16 ft. in diameter, and by 10-ft. induced-draft fans, one for each economizer and boiler. The fans, driven by geared turbines, are mounted in the space behind the boilers and above both the economizers and the main flue. Up to 300 per cent of loading the flue gases will pass through the economizers; for higher ratings they will be bypassed.

Twin Condensers Provided as Operating Economy

The turbo-generator unit, which is about ready for operation, is of General Electric make. The turbine is designed for 20,000 kw., the generator for 18,000 kw., this arrangement being well adapted for handling the short evening peaks characteristic of the railway load of the system.

The turbine is supplied with Westinghouse-Leblanc twin condensers, designed to provide for operation at high efficiency with different loads on the turbine and to give maximum flexibility in operation. If necessary, one-half of the condenser can carry the load in off-peak hours, and the load during several hours after midnight will require but one-half for best economy.

Each half of the condenser is individually driven by a steam turbine. The two halves are set at an angle, the shafts converging so that a motor set in the angle can be connected either to one condenser or the other by turning it on its foundation. This is an operation requiring a comparatively short time.

Other Improvements Under Way

The decision of the board of directors of the United Electric Railways to invest such a substantial amount in rehabilitating its own power plant is of interest at this time when a number of railway properties have adopted the opposite policy of purchasing power from central stations.

In addition to the above-described work there are now under way, or otherwise planned for construction in 1923, power-system improvements involving new substations, transmission lines and distribution circuits both overhead and underground, as well as a track circuit block signal system on about 8 miles of high-speed road. The task of handling the large amount of additional engineering and construction work required has been met very largely by the company's own engineering staff and construction forces, additional men having been added to its organization from time to time as conditions required. W. C. Slade, superintendent of power and lines of the United Electric Railways, is in charge of the power-system changes, while H. W. Sanborn, chief engineer of the company, is in charge of all building and structural-steel work involved. A. S. Davis, assistant superintendent of power and lines, is in immediate charge of the construction work in progress in the generating plant and is being aided by J. C. Millard of the engineering staff.

This article is of a preliminary nature and aims merely to give the salient features of the new parts of the plant. When it is complete a more detailed and fully illustrated account will be given, followed in due course by operating data.

Massachusetts Superpower Act Should Encourage Railroad Electrification

GOV. CHANNING COX of Massachusetts has signed a bill permitting electric companies to unite in financing and building generating stations and the necessary interconnecting transmission lines and equipment. The Department of Public Utilities will maintain its usual regulatory interest in the financing and development of installations under the act.

The bill was brought before the present session of the Legislature in the interest of several New England power companies. It is proposed that the Montaup Electric Company be formed primarily to develop a power project on Mount Hope Bay, Fall River. A generating station will be built to have an ultimate capacity of 200,000-kw., with an initial unit of 30,000-kw. The first outlay will be about $5,500,000, which will cover this unit and a part of the transmission lines. The design and construction will be handled by Stone & Webster.

This plant and its connections will, no doubt, play a part in the electrification of railroad lines in New England when conditions otherwise are favorable for such a step.

Joint Service Widens Interurban Freight Field

Ohio and Michigan Lines Have Entered Into Joint Overnight Freight Service and Have Secured Considerable Freight Business Not Heretofore Available

WHAT gives promise of bringing a large increase in the volume of freight business handled by the electric railways in the central territory is a plan that has been developing during the past year of establishing joint service with connecting interurban lines. The co-operative movement began in April, 1922, when the Northern Ohio Traction & Light Company entered into an agreement with the Cleveland, Southwestern & Columbus Railway, the Cleveland, Alliance & Mahoning Valley Railroad, the Stark Electric Company and the Pennsylvania-Ohio Electric Company for a joint freight service in northern Ohio. The Detroit & Cleveland Navigation Company and the Cleveland & Buffalo Transit Company, both steamboat lines, and the Lake Shore Electric Railway subsequently adopted the plan.

Recently the Detroit United Railway joined the arrangement, which gives connection for the Ohio lines into various Michigan cities, including Detroit, Jackson, Flint, Pontiac, Port Huron and other points. Similarly, more recently the Columbus, Marion & Bucyrus Railway and the Columbus, Delaware & Marion Railway have entered the plan, and service to Buffalo and intermediate points has been arranged by way of the Nickel Plate Railroad.

The outstanding features of the new service are the convenient loading points and overnight delivery. For example, freight reaching the Cleveland station during the day or evening is delivered at its destination the following morning. Through freight trains leave Cleveland nightly for the more important points, and a local way freight train handles the traffic to intermediate stations.

An attractive card describing the character of the service rendered has been sent by first-class mail to all shippers in the territory. The rates on all classes of freight are the same as charged by the steam railroads, and flat rates are offered for carload lots.

At first the shippers did not "fall over themselves" in the rush to utilize this feature of electric railway service. A few of them, however, liked the "overnight delivery" idea, and tried it out. Then the word passed quickly among the shippers that the new freight service was fast, that the loading point was advantageous, that care was exercised in loading and unloading, and that the "overnight delivery" was real.

At the time the Northern Ohio Traction & Light Company entered the freight business it had been doing for some time an express business under the title "Electric Package Agency." The officials of the company were a little skeptical about the new venture. It was feared that perhaps the business would be all in one direction. However, the existence of the package express business made it possible to try the more ambitious freight-handling scheme without any additional heavy investment. The company had eleven motor cars and four trailers, and four more trailers were immediately bought and put into service. During the first month about 17,000 freight car-miles were operated with gross earnings of $8,824.

Operating expenses, however, were greater than revenue, and April showed a loss of $1,500, but when it is remembered that no business was obtained by personal solicitation and that the 5,000 tons carried in the first month was attracted simply by the high quality of the service offered, it will be seen that the experiment appeared promising from the very beginning.

Experience amply justified this expectation. At the end of the first six months the small deficit had become a monthly profit of $8,000, and six more trail cars had been ordered to take care of the increasing volume of traffic. The comparative figures for April and October are interesting. They are given below:

	April	October	Per Cent Increase
Motor cars	11	11	...
Trailers	8	8	...
Motor car-miles	10,560	19,289	83
Trailer car-miles	6,659	10,799	62
Car-hours	1,084	1,857	72
Tonnage	5,108	11,926	133
Gross earnings	$8,824	$29,567	236
Ratio operating expense to gross revenue, per cent	117	71	*46

* Decrease.

It has not been possible to increase the volume of traffic very much in the past few months because the capacity of the equipment was almost reached last fall. But recently, fourteen new freight cars, including two motor cars, and two specially built trailers for handling milk have been purchased for May 10 delivery. Also, two of the older, large passenger cars have been rebuilt for this freight service.

Nowadays the Cleveland freight house of the Northern Ohio Traction & Light Company is frequently jammed to the doors and shipments have to be piled outside for want of space inside. Shippers seem very desirous of having their consignments handled over the system, but the company has reached the point where it can no longer take on additional business. As soon as more trail cars have been secured it will be possible to accommodate the growing demand for transportation.

Despite the remarkable increase in freight business, none of the express business has been lost. The latter amounts to about $20,000 a month, and if the freight revenue is taken at approximately $30,000 monthly, the total income from this service is now $50,000 a month or $600,000 a year.

The additional investment required has not been large. Four trailers purchased in the very beginning cost about $21,000. A freight house was built in Ravenna and some additional track laid; another freight house was built in Barberton with some new track. Massillon and Dover have had new freight depots, and the company spent $5,000 on the Cleveland terminal. Altogether the investment required during the period for which the revenue figures are quoted did not exceed $50,000.

Among the other companies included in the joint arrangement the success of the plan has been equally marked. The Pennsylvania-Ohio Electric Company, for example, reports that the tonnage carried increased 177 per cent during the first six months, while the car-hours operated actually decreased. The particular advantage of the joint arrangement is that each road is able to accept freight, particularly carload lots, from points on its own line for points on other lines. This part of Ohio is a thickly-settled region with a great diversity of manufacturers, and there is a vast amount of freight business which does not lie wholly within the territory of any one railway. But under the present

arrangement, whereby the several systems are tied together for the purpose of giving through freight service, it is possible to accept shipments for almost any point from Buffalo on the north, New Castle, Pa., on the east, Columbus, on the south, and Jackson, on the west.

Rebuilt Passenger Cars Used for Freight on N. O. T. & L.

It was found economical and practical by the N. O. T. & L. line to rebuild two of the large 60-type interurban cars for freight service. These cars were selected because they were the strongest of the large old interurban cars. The sides of this type of interurban car are reinforced with a 20-in. x ⅜-in. steel plate running almost up to the windowsills. This reinforcing is in addition to the heavy wooden undersills and trusses.

It was found necessary to cut this plate at the center of the car for the side door. Large aisle posts were put in beside the doors and an overrunning truss was added to both sides. This resulted in a car more capable of carrying a load of 50,000 lb. evenly distributed. M.C.B. radial drawbar couplers were put on the car and anchored to heavy steel plates. The gearing of the motors was changed from 22/55 to 17/60 to provide greater starting torque and pulling power.

The drop platforms were raised, making a straight-sill car. The rear doors were boarded up, the belt rail removed and the window openings covered with siding and sheet metal plates, extending 38 in. up around the entire car. The interior was sheathed all the way up the sides. Seats and the hot water system were removed and a new coal stove installed in place of the water system. These cars will be painted standard interurban red with the usual monogram, and will resemble the company's latest type baggage cars.

The twelve freight trailers recently bought, as mentioned above, are 43 ft. long. It was found advisable to make these trailers shorter than the standard 50-ft. baggage trailer in use at present, as the large baggage trailers develop considerable trouble from overloading, or uneven loading. The smaller cars have been made stronger than the old cars. They are of 60,000 lb. capacity and are built to stand the strain without sagging. The underframe is constructed of four 8-in. channel irons and two extra 8-in. wooden sills. Four truss rods in place of the usual two were used on these cars. The bolster construction was also made much heavier than that used under other freight equipment.

These cars are designed more to carry freight and express matter but the ends have been rounded. They will be painted a standard interurban red on the sides with the usual monogram, but the ends will be painted a traction orange color the same as used on the city cars. This will make them visible for a greater distance and is done as a safety measure.

The trucks under the cars were made by the Pressed Steel Car Company. They are standard diamond freight car trucks.

The Latest in Articulated Cars

THE Woodward Avenue line, Detroit, has the distinction of being one of the heaviest traffic routes, if not the heaviest, in the country among the two-track surface lines. This line not only operates over the principal business street of Detroit, but at its southern end it serves the ferry to Windsor, Ont., and near the northern end is an extensive residential district and also the principal factory of the Ford Motor Company. Car service at present is given by two-car trains, consisting of a motor car and a trailer, operating at close intervals all through the day, but even these are hardly sufficient to accommodate the passengers who wish to be carried. In consequence, the management of the Detroit municipal railway has been looking into all methods of increasing the carrying capacity of the line.

The accompanying drawing shows a three-car articulated train recently suggested and being seriously considered. Its principal advantage is that with only 18 ft. additional track space this train can seat 150 passengers, or forty-nine more than a two-car train, which seats forty-six passengers in the motor car and fifty-five passengers in the trailer. This seating capacity for the articulated train is based on longitudinal seats in the second and third car and cross seats in the first car. The length of the train over buffers is 113 ft., as compared with 95 ft. for the two-car train. There is also a saving in weight, that of the articulated train being estimated as 86,000 lb., or 570 lb. per seat, as compared with 73,000 lb., or about 722 lb. per seat, for the present two-car train. Another advantage is in reducing the number of operators. Two articulated trains require only eight men, or four each, whereas three two-car trains, having the same number of cars, require nine men.



Articulated Three-Car Train Proposed for Woodward Avenue, Detroit

As designed, the articulated train would have passageways between the different cars, the vestibule consisting of a vertical steel cylinder with openings in it to permit the passage of people from one car to another. The motor equipment would consist of four motors, the end trucks probably being the motor trucks, as this location would make it easier to get the motors out. It is not believed that any more stops would be required with this train than with a two-car train, because a designated system of stops is used on Woodward Avenue, and most of these stops have to be made now by the two-car trains.

The designated stops average on Woodward Avenue about ten to the mile. The train would be run over loops at each end and would be single-ended. It is expected that a train of this kind could be purchased equipped for about $30,000.

The London Underground Railways is now installing automatic railway ticket machines in theaters and department stores adjacent to the Underground stations.

Railway Co-operates in Flood Control

New Bridge Over Los Angeles River Is Completed by Pacific Electric Railway in Conjunction with County Board of Flood Control and War Department

DURING the years 1919 and 1920 the Los Angeles County Board of Flood Control and the War Department of the United States Government undertook an extensive program of flood control work on the Los Angeles River in southern California. The purpose of the undertaking was to confine the storm waters, prevent erosion of adjacent property and reduce the possibility of serious damage to surrounding farm



Setting a Steel Girder for the Los Cerritos Bridge of the Pacific Electric Railway

lands, such as had occurred in the past when the flood waters overflowed the regular channel. In the past ten years the stream has frequently changed its course during heavy storms, particularly in the district between the bridge on the Pacific Electric Railway's Long Beach main line and the point where the river empties into the Pacific Ocean. Numerous interruptions to railway service have resulted from this. The work undertaken and completed by the county and government consisted of widening and straightening the channel, constructing levees for a distance of approximately 3½ miles and installing new highway bridges. The railway company maintained a 1,000-ft. double-track pile trestle bridge over the old undefined channel at Los Cerritos, but as this structure did not harmonize with the improvements carried out by the government, it had to be replaced. Thus the railway became a partner in the flood-control enterprise.

The fact that the old bridge was 7½ ft. below the grade of the present levees and was not located at a proper angle to the newly defined channel of the stream made it necessary for the railway to build a new structure 1,500 ft. in length and to raise the level of the approach tracks. This involved the construction of 1,080 linear feet of double-track pile trestle and 420 ft. of double-track steel spans set on concrete piers. Under the existing conditions it was impossible to handle the reconstruction of the bridge while it was in service. Accordingly a single-track "shoo-fly," approximately a mile long with 350 ft. of temporary pile trestle spanning the stream and equipped with standard automatic block signals, was provided in order to maintain service on the line.

The new Los Cerritos bridge will cost about $275,000 and has seven spans, using altogether twenty-eight steel bridge girders, each 60 ft. long, 6 ft. deep and weighing 9½ tons. The total weight of all steel in the structure is 630,000 lb. The spans rest on eight concrete piers skewed 45 deg. with the track. Each pier is built upon a foundation of thirty-five piles driven to a total depth of 38 ft. below the bed of the stream, while the piers begin 18 ft. below. The dimensions of the piers are: Base, 11 ft. 3 in. x 45 ft.; top, 4 ft. 3 in. x 28 ft.; height, 32 ft., and each contains 348.7 cu.yd. of concrete. On one side of two of the piers reinforced concrete brackets were formed to carry the trolley poles.

Cofferdam methods were required for driving the piles and for placing the piers. For this particular job and future bridge construction the railway company purchased a new oil-burning steam locomotive crane. at a cost of $13,000. It has a 40-ft. boom, 20-ton capacity, and is equipped for pile driving, digging, concrete handling, loading and unloading and switching cars of material. The crane is mounted on standard gage railroad trucks and wheels and, including ballast, weighs 120,000 lb. Both efficiency and economy are promoted by the use of the new crane as it relieves motor work cars, previously used on bridge jobs, for use elsewhere.

The Readers' Forum

Concrete Ties Satisfactory in Chickasha

CHICKASHA STREET RAILWAY COMPANY,
CHICKASHA, OKLA., April 18, 1923.

To the Editors:

I have been interested in the numerous articles which have appeared in the ELECTRIC RAILWAY JOURNAL relative to substitutes for wood ties. In this connection the experience of our railway may be of interest.

About seven years ago the writer began experiments with a concrete tie, which, after numerous changes, was developed into a type that, after four years of service, is perfectly satisfactory. The tie is of reinforced concrete 24 in. long, 18 in. wide and 8 in. thick, placed lengthwise under the rail.

Two ties take the place of two wood ties. Extra wide ties are used at joints. The rails are held to the ties by means of spikes imbedded in the concrete. The track gage is preserved by means of tie bars placed at the joints and midway between, and there has been no trouble with spreading of the track.

We have had concrete ties in use in concrete streets about two years. These ties are laid under 65-lb. rail, and the concrete paving is filled in 6 in. deep, finished smooth on top, with a filler every 6 ft. The paving to date shows no cracks or effects of movement of the track. Heavy single-truck cars are used by this company, and these, in my opinion, are more destructive of tracks than double-truck cars.

On a small road like this one and located as we are, the freight item on ties is serious. We can buy the material as needed, so that the monthly outlay is not large. We install the ties within ten days after they have been made.

The design of these ties is covered by patent.

W. H. WADSWORTH, Superintendent.

American Association News

Public Opinion and the Steam Railroad Situation*

By Britton I. Budd
President Chicago Elevated Railroads

WITH the return of business and industrial activity, the efficient handling of the transportation of the country becomes a question of the gravest import to every citizen. Railroad executives have a tremendous responsibility resting upon them. They deserve and should have the active and intelligent support of every business man.

To an interested outsider this support appears to be lacking. Instead of receiving encouragement in the great constructive work they are doing, the railroads are being constantly criticised for failing to do the impossible. Actual accomplishments are lost to sight, or greatly minimized, while failures are magnified to such an extent that the public is losing confidence in the ability of the roads to perform their functions. If this state of public mind is permitted to go unchecked and to become confirmed, the results will be disastrous to the railroads and to the country.

The reasoning business man should understand that prosperity and the expansion of trade and commerce are definitely limited to the extent that the railroads are able to supply the means of transportation. In many instances, however, we find his mind diverted from the real problem by glittering generalities of waterways, motor transportation and other subjects which are merely incidental.

With the unthinking mass, lack of confidence in the railroads takes a different form, which leads directly to government ownership and operation. Although the experience of the country with government operation of railroads should be sufficient to determine future policies for a generation at least, it does not appear to have had that effect, for the clamor for public ownership and operation, although somewhat diminished. has by no means been stilled. Another serious phase of the present dissatisfaction with the railroads is the effect it has on the credit of the various companies.

How is confidence in the railroads to be restored? That is the most important problem which confronts them. There can be no doubt of the ability of the roads to give the country adequate transportation if they have the confidence of the people. It seems equally certain that the confidence of the public cannot be secured by making apologies and explanations.

The policy which the railroads generally have pursued should, in my opinion, be completely reversed. Their publicity departments should stop making apologies and explanations, and tell the public some of the things the railroads have done and are doing. A notable few are pursuing that course, but the policy should be general. It should be systematic, extensive and intensive.

There is every reason why the railroads should drop the negative and assume a positive position in their publicity and advertising. They have a wonderful story to tell. The record of accomplishments stands out so prominently that it commands at once the attention and admiration of every thinking citizen. It should be made known to every one who speaks and reads the language of our country.

When the railroads were turned back to their owners by the government the extravagance and inefficiency which had marked government operation became fairly well known. It was not, however, exploited as fully and as extensively as it might have been. The story of how the roads reduced the number of employees by hundreds of thousands, while at the same time they increased the tonnage carried, was of absorbing interest, and advantage might have been taken of the situation to squelch effectively the menace of government ownership and operation.

They met the extraordinary demand made upon them following the resumption of coal mining in a manner that should have earned them the lasting gratitude of the country which they saved from the serious consequences of a coal famine. But, while they earned the gratitude of the people, they did not receive it. Instead they were criticised for not doing more, and they contented themselves with explanations of car shortage rather than in telling the public what they actually accomplished.

Success Begets Confidence

There is nothing, in my judgment, which makes as favorable an impression on the public mind as a definite record of achievement and of steady progress. Success begets confidence. The public takes little interest in the financial troubles of a railroad, or of an individual. Excuses and explanations cause only irritation. An appearance of prosperity does much in the way of establishing credit.

To an outsider the publicity policy of the railroads would appear to be a plea for public *sympathy*. That is wrong psychology, in my opinion. It may relieve the feelings of a man suffering with rheumatism to tell a friend how miserable he is, but it does not interest the man who has to listen. He would rather hear about something else.

So it is in the case of the railroads and the public. That the roads are not earning fair returns on the invested capital is a matter that is quite serious to railroad investors, but is only of minor interest to the public.

*Abstract of address presented at a meeting of the executive committee of the American Electric Railway Association, held in New York April 6, 1922. Mr. Budd was talking about the psychology of winning public approval and cited the steam railroad situation as an example.

Engineering-Accounting

A FRUITFUL meeting of the joint Engineering and Accountants' Associations committee on engineering-accounting was held in New York on April 24. The day was spent by the committee in working out the details of such subdivisions of the items in the standard classification of accounts as would give the engineering department what it needs in the way of data to enable it to keep track of detail costs. The feeling of the committee was that, by co-operation between the accounting and engineering departments, such data can be secured as will permit the maximum of economy in the carrying out of engineering work. At the same time it was realized that the accounting department should be burdened only with such an amount of routine work as will actually prove useful.

The New York meeting was attended by Chairman L. R. Brown, Rochester, N. Y.; E. D. Dreyfus, Pittsburgh, Pa., and C. R. Harte (sponsor), all of the Engineering Association; and Chairman G. F. Dinneen, Holyoke, Mass., and J. E. Heberle, Washington, D. C., of the Accountants' Association.

News of Other Associations

Spring Meeting of A.S.M.E.

AT THE meeting of the American Society of Mechanical Engineers, to be held in Montreal, Canada, May 28 to 31, three simultaneous technical sessions will be held each morning, and the afternoons will be devoted to visits to interesting industrial plants in the city.

Iowa Association to Meet

THE annual convention of the Iowa Electric Railway Association will be held at the Hotel Hanford, Mason City, Iowa, on June 20, 21 and 22. This will be held in conjunction with the annual convention of the Iowa section, National Electric Light Association.

Southwestern Association

THE program is being arranged for the annual convention of the Southwestern Public Service Association, which will be held in Fort Worth May 15 to 17. Announcements of the details will be made in an early issue of this paper.

Maintenance of Equipment

Spray Painting of Electric Railway Cars

Results Obtained from the Use of Spray Painting on Numerous Electric Railways Show That It Saves Time, Is Economical in Material and Is Not Injurious to Workmen

By Leon L. Wolf
Railway Sales Manager R. F. Johnston Paint Company, Cincinnati, Ohio

DURING the war and following the war labor was very scarce and prices high, both for labor and materials. This created a pressing demand for a system whereby the electric railway companies of the country could paint and protect their rolling stock at the lowest possible outlay of money. Many companies during the war had allowed their equipment to go without paint and this had caused a rapid deterioration. It was the consensus of opinion that one of the most important problems confronting them was the protection of their equipment from deterioration, as most properties were operating at a loss and did not have the money to spend to protect their equipment due to the expensive methods that were necessary to accomplish the results. Not only were the expenses taken into consideration, but the length of time a car was laid up in the paint shop under the old methods was excessive and the railway companies needed every piece of equipment they had.

About this time the R. F. Johnston Paint Company of Cincinnati, Ohio, began carrying on an extensive and intensive campaign of tests of spray machines and materials for the painting of cars. Up to that time spraying had been used to a certain extent for spraying furniture, automobiles and freight cars. With the co-operation of the manufacturers of spray machines and with the improving of many materials that were available, great speed and economy were attained without sacrificing durability. And with this successfully accomplished, we produced a line of paints whereby street cars could be properly, quickly and economically painted and protected from the elements by the use of the spray gun without keeping cars in the paint shop longer than two and one-half to three days, whereas under the old systems it required from eight days to four weeks from the time the car came into the paint shop until it went into service again. Proceeding along the line that the spray could be successfully used, it was first tried out on new car work, and the writer was invited by a car manufacturer to spray fifty new cars which were under construction. This test showed that great speed could be obtained and a very smooth job, free from brush marks and with an even film, could be produced, and during this test one man was able to spray a coat of enamel on a one-man safety car in twenty-eight minutes. This test proved economical in both time and labor.

The next test was to ascertain the amount of material consumed per car. To ascertain this, two cars 48 ft. over all were painted, one by hand and one by spray. It required 17 per cent less material to paint the car with a spray than it did by hand. This clearly demonstrated that a real saving could be made by the adoption of the spray system, and an actual saving in labor and material in the painting of street cars between brush work and spray work amounted to approximately 47 per cent.

In one of the largest electric car manufacturing plants in the country this system was installed three years ago and every car turned out of that plant since has been sprayed. The writer has been informed by the general manager of this plant that there never has been a complaint and they have never had to repaint a car turned out with this system, whereas by the old methods they had been called upon to repaint cars in many instances or make allowances for repainting of cars that had required it within a year.

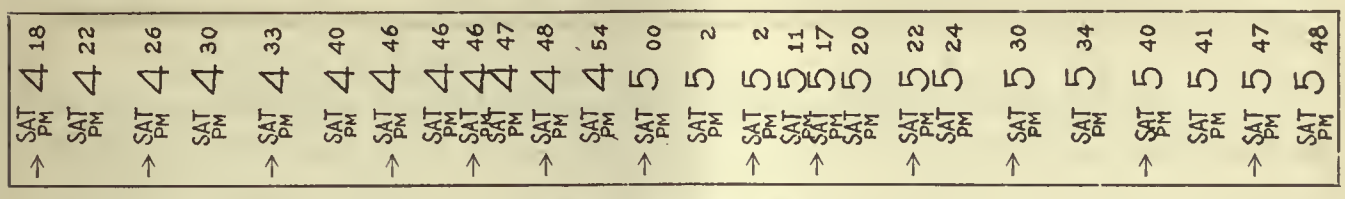
The spray system was tried by the Milwaukee Electric Railway & Light Company and it proved so successful that it was adopted as its standard in November, 1920. Since that time the company has been able to double its production at a greatly reduced cost. Another large property to adopt the spray system was the Eastern Massachusetts Street Railway, where it has been used with great success.

The Bloomington & Normal Railway has cut its expense by use of spray painting. The Oklahoma Railways in 1921 under the old system turned out twenty-four cars in its paint shop, or two cars per month. In 1922 with spray painting it painted 124 cars, or ten and one-third cars per month. This was five times as many cars as it had painted the year previous at practically the same labor cost. The Georgia Railway & Power Company, Atlanta, Ga., finished five and one-half cars in as many days at an average labor cost of $38.16 per car. I had the pleasure of inspecting these cars after they had seen a year of service and found all to be in good condition, notwithstanding the fact that many had been stored out in the open.

Many electric railways have since adopted the spray painting system, among which are: The Tri-City Railway, Davenport, Iowa; Birmingham Railway, Light & Power Company, Birmingham, Ala.; Memphis Street Railway, Memphis, Tenn.; Indianapolis Street Railway, Indianapolis, Ind., and Interstate Public Service Company, Indianapolis, Ind.

The old methods of street car painting were good in their time, but improvements were necessary to keep pace with other electric car developments. It is possible now to paint a car in one-half to one-third the time, to keep the equipment looking as good for as long a period of time as ever before and at the same time to reduce both the cost of labor and material.

Some labor organizations contend that the spraying of paint is injurious to the workman. However, my investigations along this line have proved conclusively to my satisfaction that no one is in any wise harmed. Furthermore, there are just as many men employed in all the shops where the spray system has been put into use as formerly, but the production has been in all in-



Section of Recorder Tape

stances materially increased, and in some cases quadrupled.

In conclusion, it is obvious that the spray method of painting is the logical system to employ because it is enabling the various properties to keep their equipment economically and well protected from deterioration, with suitable paint and varnish coatings.

The scientific sections of the research departments of the Paint Manufacturers' Association of the United States and of the National Varnish Manufacturers of the United States concur in my statements to the effect that there is nothing injurious in paints and varnishes when used with spray any more than there would be if applied by brush, and at recent meetings of the various associations the use of the spray gun has been recommended highly. Many coatings which have been used in the paint shops of the street railway industry for years have contained more or less white lead.

Direct-Reading Headway Recorder

THE accompanying illustrations show a Cincinnati Time Recorder Company's clock, which has been converted into a direct reading headway recorder by the addition of some mechanism in the shop of the Lehigh Valley Traction Company, Allentown, Pa. Most railway men are familiar with the operation of this time clock in stamping time cards, which are placed in position through a slot in the front while the handle is pulled down to record the time.

In order to use this clock as a headway recorder, the Lehigh Valley Transit Company added the mechanism necessary for installing a tape which would be fed automatically underneath the time stamp by a ratchet mechanism. An electric solenoid was installed for the operation of the time stamp, and by having a contact on the trolley wire the circuit is closed by each passing of the car and the clock mechanism is thus operated. The stamping of the tape thus gives a record of the time that each car passes the location where the recorder is installed.

A general idea of the mechanism may be obtained by referring to the accompanying illustration which shows the clock open. The roll of tape is installed on the upper right-hand reel and passes from this down to the plate and across this underneath the time stamp, where it passes over a roller and thence down to another reel which receives the tape. This latter reel has a ratchet attachment, and each operation of the stamp ratchets the reel around so as to move the tape to a new location for the next time stamp. As the tape winds up on the receiving reel this increases in diameter, and of course the distance between the time marks will increase accordingly. The ratcheting mechanism is arranged so as to give a distinct marking with the smallest diameter of tape. The operating solenoid is installed underneath the clock at the lower right-hand side and operates the mechanism through connecting links.



Headway Recorder Clock in Box on Pole with Operating Contactor on Trolley Wire



Headway Recorder Clock Open to Show Operating Mechanism

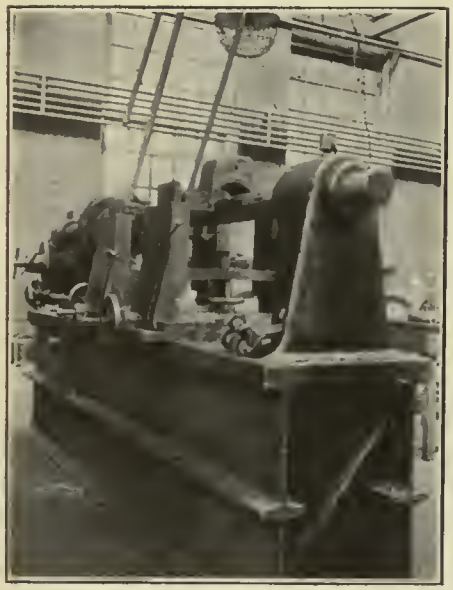
Where it is desired to record the headway of single-track lines or in but one direction of double-track lines, the mechanism just described is all that is necessary, but where a record is desired of the headway in both directions on a double-track line, an additional index with operating mechanism is necessary. This operation is accomplished by having a small index plate with an arrow which slides back and forth underneath the time stamp. With the arrow directly underneath the stamp its operation will cause an indication to be stamped on the tape, and by placing this a short distance to the left, no indication is given. For operating this sliding index, two solenoids are used, and of course with the double-track operation two contacts are necessary on the trolley wires. The operating circuit is then from the contact through the solenoid operating the index and then to the large solenoid which operates the time stamp. The arrow index is then pulled into position for stamping whenever a car passes on one track, and is pulled out of the way so that no arrow appears on the record for cars passing in the opposite direction on the other track. The movement of the index is accomplished through a bell crank lever, one end of which is attached to the rod connecting to the solenoid.

In Allentown rolls of tape are used made from the usual type of adding machine tape by cutting it in two to give a width of $\frac{7}{8}$ in. An accompanying illustration shows a section of tape as stamped by the recorder. This mechanism provides a direct reading record and, of course, is entirely automatic. As the time clock requires winding but once in eight days, very little attention is neces-

sary other than to make certain that sufficient paper is provided for the record.

In Allentown the clock is installed in a box which is mounted on one of the poles at the side of the street. A cut-out switch and fuse is installed in the circuit for protection to the operating mechanism, and in the summer months a lightning arrester is also added. The front of the box is closed and locked so that the mechanism cannot be tampered with.

Special Machine for Boring Bearing Caps



Special Machine Used for Boring Bearing Caps at Providence

WHERE the number of jobs of a similar character in a railway maintenance shop is sufficiently large, it sometimes pays to arrange special machinery for performing specific operations. This applies, on the property of the United Electric Railways, Providence, R. I., among other things, to the boring of bearing caps.

For this purpose a boring mill, of the form shown in the accompanying halftone, is used. The bed of this is constructed of light I-beams, diagonally braced and mounted with a cast-iron top carrying the headstock and tailstock. A pair of special carriages of the form shown permits quick clamping and adjustment of the cap over the boring bar. This machine was originally built and used for reboring armature bearing seats in motor frames before the purchase of a standard horizontal boring machine more suitable for the work.

New Equipment Available

Attachment for Control Switches

AN ATTACHMENT that can be added to any type CS circuit-breaker control switch to make automatic the circuit breaker controlled from it has been placed on the market by the Westinghouse Electric & Manufacturing Company. With this attachment added, the breaker cannot be held in the closed position on overload or short circuit when arranged to trip from the current transformer only or from a current transformer actuating circuit closing relays.

To apply the attachment to existing installations of type CS control switches it is only necessary to shorten the switch shaft and drill a hole for the engaging pin. The attachment consists of a coil, a magnetic circuit, a moving core, and a trigger normally engaging the switch shaft, so arranged that when the coil is energized, either from a direct current source through relays or from excessive current when connected to current transformers, the core is moved in the direction necessary to release the trigger. This allows the switch shaft to return to the neutral position.

When a circuit breaker is closed on an overload or a short-circuit, the trip-free attachment immediately operates and allows the control switch to return to the neutral or off position simultaneously with the tripping of the breaker. Before the circuit breaker can be again closed, it is necessary to turn the switch handle to the off position to engage the switch shaft.

Improved Trolley Splicer

A GOOD trolley splicer should join the wires positively and present a smooth surface thereafter for wheel, shoe or pantograph. The improved Clark splicer, put on the market by the Drew Electric & Manufacturing Company, Cleveland, Ohio, is said to meet these requirements. The photographs show the construction. It is of cast metal, the lips having reinforcing lugs cast inside at the inner end. Whether the wire going through the splicer is full thickness or worn, these lugs rest on the wire when the lips are peened over. The lips extend lengthwise beyond these lugs toward the center of the splice and rest firmly on a shelf built into the splice body. These two features make a solid, smooth under-run when the splice is first put up and prevent the later formation of the notch or rough spot so common to many splicers.

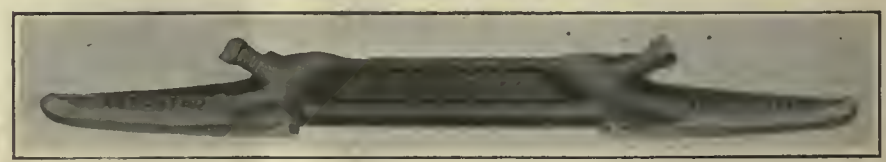
The splicer is made in two forms, one of which, shown in the illustration, is for repairing breaks in the line, while the other is in the form of a suspension ear. Both designs are made for sizes of wire from No. 0 to No. 0000 inclusive.



Under View, Showing Lugs for Holding Wire in Place



Appearance of Splicer After Application



New Type of Trolley Splicer

The News of the Industry

Arbitration in Cleveland

Men Demand Fifteen Cents an Hour Increase, Which Will Cost Car Riders $1,140,000

Interesting facts and statistics regarding the income and expenditures of motormen and conductors were brought out in the arbitration proceedings on the demand of Cleveland (Ohio) Railway trainmen for a 15 cents an hour wage increase. The arbitration proceedings have just been concluded and the arbitrators are to announce their decision in time for whatever increase is permitted to take effect May 1.

Although the men had demanded an increase from 50 cents an hour for the first three months service, 53 cents an hour for the next nine months service and 55 cents an hour thereafter, to 65, 68 and 70 cents an hour, respectively, when the arbitration proceedings began they asked that they be permitted to introduce evidence showing the necessity for an even greater boost. They were overruled in this contention, however, and the arbitrators held that the question that would be decided was: as follows:

Shall the wages of trainmen be increased from the present rate to a sum not exceeding 65, 68 and 70 cents per hour, and if so, to what sum?

W. M. Rea, secretary of the carmen's union, testified that the minimum amount of money required to take care of a family of five in Cleveland, without allowing anything for savings, was $2,143. In a detailed budget he itemized this expenditure as follows:

Food, $686.42; rent, $540; clothing, $312.85; shoes, $67.50; fuel, $144.00; renewal of furniture and maintenance of household effects, $85; sundries, $57; union dues, $18; insurance, $71; ice, $12; barber, $9; street car fare for family, $13; amusements, $26; doctor and dentist, $50; tobacco, $36.50; summer recreation, $15.

In the sundries item he allowed $25 for Christmas, $26 for church, Sunday school and charity, and $6 for literature. His budget was based upon the needs of a man and his wife, with a boy eleven years old, a girl five and a baby two years old.

In rebutting this budget, the company contended that a family of four could get along on $1,480 a year, divided as follows: Groceries, $391.73; meats, $96.12; clothing, $191.28; rent, $510; heat and light, $113.52; miscellaneous, $177.84.

The company offered figures to show that wages of trainmen had increased 83.33 per cent since 1914, while living costs, according to their figures, had gone up only 69.12 per cent.

The company said that one-quarter of each 5-cent fare is now going for the wages of motormen and conductors, and quoted figures to show that in 1919 wages paid trainmen amounted to $4,266,000 and in 1920, when the men's wages were at a maximum of 70 cents an hour, the total amounted to $6,002,000, while under a 20 per cent wage reduction in 1921 the total the company expended for wages was reduced to $4,979,000 and with a further reduction of 8⅓ per cent in 1922 the cost of wages for trainmen was $4,338,575.

The company said that for each penny an hour advance to the men the extra cost to the company is $78,450 a year, and if the men got the 15 cents an hour rate they demanded, the total cost each year to the car riders of Cleveland would be $1,140,000.

Paul E. Wilson, secretary of the company, testified that a survey of the 2,827 trainmen employed by the company showed that 77 per cent of them were married, that approximately 50 per cent of the married trainmen owned their own homes or were paying for their own homes, and that 16 per cent of them owned automobiles. He said that the average rent paid by the trainmen was $33.36 a month, as opposed to the $42.50 a month rental claimed by the men.

The men introduced testimony to show that painters in Cleveland are getting $1.12 an hour, pattern-makers from 90 cents to $1.10 an hour, pavers $1 to $1.25 an hour, and other skilled tradesmen equally high wages. They contended that on the basis of a nine-hour day, the men would have to receive 78 cents an hour to earn $2,143 a year, the minimum budget, according to their contention, for a family of five.

The feeling is held in Cleveland that the board of arbitrators, consisting of Fielder Sanders, former Street Railway Commissioner, chairman; Thomas P. Schmidt, named by the company, and Judge Frederick P. Walther, named by the men, will grant the men an increase of between 5 and 10 cents an hour.

John J. Stanley, president of the company, says that other employees of the company will receive an increase in pay if the board of arbitration decides to boost the trainmen's wages.

Railway and Bus Companies Apply for Rights

Moves Made Recently in Los Angeles Would Provide for Constructing First Unit of a $20,000,000 Subway System, with $6,000,000 to Be Spent at Once for Bus and Railway Extensions

FORMAL applications have been made by the railways at Los Angeles, Calif., to the local Public Utility Commissioners for approval of a program of extensions, including the establishing of three jointly operated crosstown motor bus lines on Western Avenue, Vine Street and on Vermont Avenue. They embody plans that call for the immediate expenditure of $6,000,000 to improve transportation conditions to meet the tremendous growth of the city. This, however, is just one phase of the matter.

On April 18 William G. McAdoo, counsel for the People's Motor Bus Company, applied to the board for one-year permits to operate motor buses in the city over twenty-nine routes. He stated in his applications that if permits are granted his company will place its buses in operation within thirty days after the permits are passed. If the board is unwilling to grant one-year permits, his company will accept permits for the rest of the calendar year 1923. This request for the permits is regarded as an attempt of the McAdoo-Hellman interests to establish lines at once, without waiting for the "straw vote" at the May 1 primary election on the plan to give his company twenty-one-year franchises.

The People's Motor Bus Company originally asked for franchises over nineteen routes, paralleling railway lines, and serving Hollywood and other sections of Los Angeles, and coming to the edge of the prohibited congested district of Pershing Square. In the latest applications for one-year permits ten additional routes are set forth. Fares are not mentioned, but it is presumed that they will be 10 cents. The lines covered by the latest applications would reach into practically all sections of the city, parallel the street car lines and compete with them.

Another bus concern known as the Glendale Motor Bus Company is also seeking permits to operate its buses over sixteen routes in various parts of the city. It, too, is asking for one-year permits from the board pending the outcome of the twenty-one-year franchise fight at the May 1 primaries.

The Traffic Betterment Association is conducting an active campaign against the motor bus interests. It is advertising in the daily papers and is also distributing hand bills outlining the facts in the fight. The Automobile Club of Southern California, with 80,000 members, has issued a resolution protesting against the invasion of Los Angeles by the bus.

It is understood that the Board of Public Utilities will not take any action on the bus applications until after the May 1 election.

Pacific Electric Applies for Subway Franchise

On April 20 the Pacific Electric Railway formally filed with the City Council of Los Angeles an application for a forty-year franchise for the construction of a rapid transit subway for its interurban trains. The company says that the $5,000,000 subway which it is willing to build from First and Glendale Boulevard to Pershing Square is the most important project yet suggested for the relief of traffic congestion in the city of Los Angeles.

In September, 1922, the company obtained a forty-year franchise to construct a rapid transit subway for serving Glendale, Hollywood and San Fernando Valley points, but proposes, if granted the right by the City Council, to extend this subway from its Hill Street terminal to Pershing Square as the first unit of a $20,000,000 subway system. Other subways will radiate from Pershing Square terminal east and west. The use of Pershing Square as a centralized terminal for the system of subways is in accordance with the idea submitted by public officials and engineers and approved by the Los Angeles Planning Commission, Los Angeles Traffic Commission, Community Development Association and the Los Angeles Chamber of Commerce.

Under the subway franchise sought the railway would pay the usual 2 per cent of its gross revenues for the subway right.

Action on Viaducts Over River

On April 20 the City Council accepted the proposed division of the expense of grade-crossing separations and new viaducts over the Los Angeles River, as recommended by the Council's special viaducts committee, under which the city's share of the expense will be one-fifth of the $6,000,000 required to carry out the proposed improvement program. A bond issue for $1,200,000 to pay the city's share of the improvement will be placed before the voters at the June 5 city election.

With similar formal acceptance by the county of Los Angeles, street railways and steam roads of the division of the expense, a contract can then be entered into and the work commenced of constructing six new viaducts over the river. It has been tentatively agreed that 40 per cent of the total expense of the six new viaducts, including track depression and damages, shall be borne by the steam railroads, and the remaining 60 per cent be divided equally among the city, the county and the electric railways.

Majority on Utilities Board Favors Only One Permit

While it is thought the Board of Public Utilities in Los Angeles will not act on the deluge of applications received from various sources for one-year permits to operate motor bus lines in the City of Los Angeles, yet Commissioner Bogardus stated that the board in making its recommendations would recommend all bus permits to one concern—that the board would not split up the permits, allowing one company certain routes and another company other routes—that a unified system is wanted, and to this end they will recommend that the permits be awarded on the basis of the greatest advantages to the greatest number.

$4,000,000 in Improvement Demanded

Cincinnati Street Railway Passes Resolution Requiring Traction Company to Meet Lease Terms—President Schoepf Expected to Reply Soon—Has No Comment to Make at Present Time

THE Cincinnati (Ohio) Street Railway has made formal demand on the Cincinnati Traction Company to make repairs and replacements to the electric railway system of Cincinnati to the extent of $4,000,000. The Cincinnati Traction Company, which leases the properties of the Cincinnati Street Railway, is in default of its franchise obligations, according to resolutions adopted by the board of directors of the lessor company.

The action was taken following a report made to the board of directors of the Cincinnati Street Railway by its special counsel, Judge Rufus B. Smith, Samuel Assur and Robert A. Taft. Under the franchise terms the Cincinnati Traction Company has ninety days in which to meet the demands made upon it.

W. Kesley Schoepf, president of the Cincinnati Traction Company, said that he would answer the Cincinnati Street Railway in due time, but for the present had no statement to make regarding the demands. .

The report recites the legal relations between the Cincinnati Street Railway and the traction company and also summarizes the physical condition of the Cincinnati Street Railway as found by Stone & Webster, Inc., Boston, Mass., who had been engaged to make an expert investigation.

The action of the Cincinnati Street Railway board is regarded as the initial step in the movement to settle the traction problem in Cincinnati by means other than mutual negotiations. In the event the traction company fails to comply with the demands made upon it in the specified time, the matter will go to arbitration. If the arbitrators find the defaults exist, as claimed, action to terminate the lease will be initiated along lines provided for in the leasing document. It is understood that the Cincinnati Street Railway will seek this severance of relations amicably, but if necessary is prepared to resort to litigation.

Without regard to the question of how such a big improvement program may be financed, it is said to be an engineering impossibility to put through the betterments and repairs demanded in less than two or three years.

Accompanying the report was a schedule of the repairs said to be necessary to tracks, equipment plants and other properties. The repairs and replacements as indicated totaled $3,947,918, with an additional $965,400 for replacement of obsolete cars. This would make a total of $4,912,917, but in the item of cars the Cincinnati Traction Company has under construction a large number of new cars for this very purpose.

The Cincinnati Traction Company claims it has spent more than $12,000,000 on the properties for improvements, betterments and extensions, and these items would be the basis for substantial claims by that company. When the Cincinnati Traction Company leased the Cincinnati Street Railway's properties in February, 1901, it also assumed its franchise which was granted through a special act of the Ohio Legislature in 1896 and which does not expire until 1946.

The Cincinnati Street Railway can make no further move until the three-month period is up. During that time it is expected the Cincinnati Traction Company will present a detailed statement in reply to all demands and claims made by the lessor company.

The action of the Cincinnati Street Railway was unanimous with the full directorate in attendance. The directors are: Samuel Assur, Charles P. Taft, Robert A. Taft, Bayard L. Kilgour, A. J. Becht, Judge Rufus B. Smith, Charles Dupuis, Charles Windisch, Charles D. Jones and George Lewis.

The report of the special counsel for the directors of the Cincinnati Street Railway, made under date of April 20, contained a summary of the work which Stone & Webster reported should be carried out. A recapitulation of these repairs and replacements follows:

Repairs to tangent track	$786,769
Repairs to layouts of special work	315,092
Repairs to cars	101,500
Repairs to Pendleton power house equipment	110,800
Repairs to buildings and structures	39,903
Repairs to pole lines, etc.	28,750
Total repairs	$1,382,814
Replacements of tangent tracks	1,943,379
Replacements of paving	295,206
Replacements of layouts of special work	326,118
Total replacements	$2,564,703
Total repairs	1,382,814
Grand total	$3,947,517
Replacement of 198 cars	965,400

In the matter of replacing the 198 cars the special counsel explain that they understand the lessee has contracted for seventy new cars. These cars, say counsel, are to be purchased by the issuance of equipment notes. Under these circumstances they feel that the sum estimated for this replacement should not at the present time be included in the repairs and replacements specifically to be requested of the

lessee company, but that it be dealt with on a separate basis.

As counsel see it "the report of Stone & Webster thus shows serious defaults of the lessee company under the covenants of the lease." They then say:

A security of the lessor company for any default of the lessee is the property itself. It is contemplated by the terms of the lease that the property shall always constitute a first-class modern and efficient street railroad system so that in case of any default the lessor can at once take possession and operate the property without the necessity of expending large sums for repairs and replacements. A street railroad system requiring more than $4,000,000 of repairs and replacements is not the security contemplated by the lease. It is a fundamental principle of the lease that the system be kept in first-class repair.

In concluding its resolution directing the attention of the Cincinnati Traction Company to the existing conditions the company said in part:

We hereby notify you that you are in default under the provisions of said lease, and we further notify you to do and perform the covenants thereof in the following respects, to wit:

1. Proceed forthwith to make certain repairs in and about the trackage (tangent track and layouts of special work), street cars, buildings, power houses, equipment, poles, lines, and overhead structures of this company, an itemized list of which repairs and the approximate cost thereof is hereto attached marked Exhibit A, and made a part hereof.

2. Proceed forthwith to make certain replacements and renewals in and about the trackage (tangent track and layouts of special work of this company), an itemized list of which replacements and renewals, and the approximate cost thereof is hereto attached, marked Exhibit B, and made a part hereof.

3. Proceed forthwith to restore the street paving in and about the making of the replacements and renewals set forth in Exhibit B, an itemized list of which is attached hereto, marked Exhibit C, and made a part hereof.

Be it further resolved, that the Cincinnati Traction Company is in default under the provisions of said lease in the following respects, to wit:

1. It has acquired materials, machinery, rolling stock, equipment and other property (acquired and used for and in the operation of the leased premises) subject to liens prior to the liens reserved in said lease to the lessor, which liens are not in favor of mechanics or material-men; such acquisition of rolling stock, equipment or other personal property either in kind or value and amount as delivered under said lease; all in violation of the covenants contained in the first paragraph of said lease.

2. It has failed to maintain, keep in good order and repair, renew and replace the necessary power houses of the lessor, and maintain and perpetuate the said street railway plant entire, all in violation of the fourth paragraph of said lease.

3. It has failed to make additions, renewals and replacements to rolling stock necessary to meet the requirements of the business in violation of the fourth paragraph of said lease.

Be It Resolved, That notice in writing of said default and failure to perform the covenants of said lease be given to the Cincinnati Traction Company under the provisions of Section 11 of said lease, which notice shall be in the following form.

The Cincinnati Traction Company:

We hereby give you notice under the provisions of paragraph No. 11 of the lease from the Cincinnati Street Railway Company to yourselves dated Feb. 21, 1901, that you are in default under the provisions of said lease, and further notify you to do and perform the covenants thereof in the following respects:

1. That you pay off all liens on materials, machinery, rolling stock equipment and other property acquired and used for and in the operation of the leased premises, and prior to the lien reserved in said lease to the lessor, except liens on rolling stock, equipment or other personal property either in kind or value and amount as delivered under said lease.

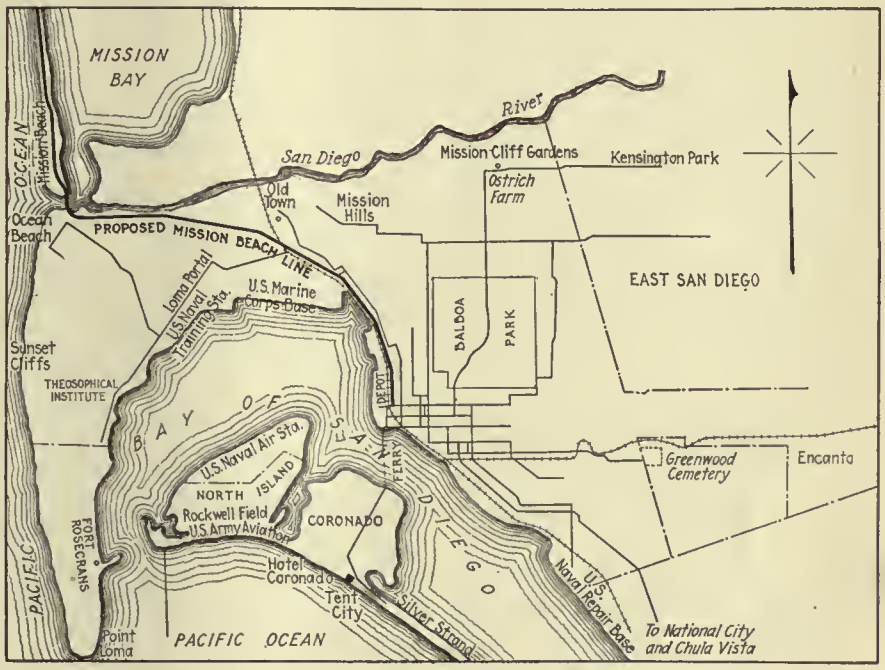
2. That you maintain, keep in good order and repair, renew and replace the necessary power houses of the lessor, and maintain and perpetuate the street railway plant entire in such respect.

3. That you make all additions, renewals and replacements to rolling stock necessary to meet the requirements of the business.

$2,500,000 on New Development

San Diego Electric Railway Has Applied for Franchise for Railroad Line to New All-Year-Round Beach Resort—Business and Residential Sections to Be in Close Contact

PROMISING to construct an all-year beach resort different from any on either the Pacific or Atlantic coasts, the San Diego (Calif.) Electric Railway announces that it will spend about $2,500,000 in the development of Mission Beach, in San Diego. The project as announced by Manager Claus Spreckels of the railway company involves the building of 8.08 miles of double-track electric railway, or 16.16 single-track miles, and the building of an auditorium, dance floor, bathhouse and housing for amusement concessions covering about 30 acres, construction of an ocean pier and dredging a portion of Mission Bay for boating and swimming. Application was made April 2 to the City Council for the necessary franchise for the new railroad line and construction work is to be rushed as soon as the necessary permission is secured.



Map Showing Relation of Mission Beach Line to the Rest of the San Diego Railway System

Mission Beach, white and hard and with a gradual slope into the ocean, is said to be one of the finest beaches in California. A few hundred feet across the strand lies Mission Bay. A portion of this, to be known as Bonita Bay, will be dredged out for boating and swimming. Bathers can enjoy either the surf on the ocean side or swimming in the warmer water of the bay side of the strand, or both, as they choose. The beach has been popular with the people of San Diego despite the lack of transportation. With the completion of the new electric line the beach will be only fifteen or twenty minutes ride from the business district of San Diego.

In conjunction with the building of the beach resort and electric railway, the Mission Beach Company, also controlled by the Spreckels interests, is converting the remainder of the Mission Beach land into home sites. Since last fall work has been in progress grading and paving streets, laying gas and water mains and sewers and installing electric service and assisting lot buyers in building homes, with the result that a sizable community already exists as potential patrons of the new car line. They are now being served by a "stub" service from Ocean Beach.

The relation of the proposed new line to the existing street railway in the city is shown on the accompanying map. The new line will run largely over private right-of-way, so stops between the beach and the business section will be few and service correspondingly speedy. The result will be to place the new beach resort and residential district in as close communication with the city as are the choicest existing residential sections of the city. The route of the new line is shown on the map by the heavy black line and the existing routes by the lighter lines.

Later on, it is stated, the new line may be extended to La Jolla, a fashionable seaside community toward the extreme northern limits of the city of San Diego, now without rail transportation, but nothing definite about this was announced at this time.

The type of construction of the new line will differ from the standard on which the company's city lines have recently been reconstructed and is described at length in the Track & Roadway columns of this issue.

The San Diego Railway has ordered fifty cars from the American Car Com-

pany of St. Louis and they will be completed in time to be put in service on the new line. They were described in the April 21 issue of this paper.

The building of the new Mission Beach line and the construction of the all-year-round resort at Mission Beach is the largest single construction enterprise to be undertaken in San Diego since the building of the exposition of 1915-1916 and reflects the faith that John D. Spreckels, president of the San Diego Electric Railway, has in the future of the city of San Diego.

Heavy black lines on the accompanying map show the proposed new electric railway to Mission Beach, construction on which is to begin at once and which, together with the all-year-round resort at the beach to be built by the company, will cost around $2,500,000. The line will start at the Santa Fé (Union) station, at the foot of Broadway, and run northerly and westerly to the bridge over the entrance of Mission Bay, thence northerly to the north line of the Mission Beach subdivision, a total distance of 8.08 miles. At present Ocean Beach and the intervening territory are served by the Ocean Beach line, paralleling the proposed new line as far north as Barnett Avenue, thence turning westerly past the United States Marine base and the United States Naval Training station, then turning north on Voltaire Street to Bacon Street.

Illinois Appellate Court Says Thompson Suit Was Properly Dismissed

The Appellate Court of Illinois decided on April 24 that the Thompson administration suit to collect the city's Surface Lines profit, outside of the franchise contract, was properly dismissed by Municipal Judge McKinley.

These profits, 55 per cent of the net receipts, now total more than $8,000,000, which, as mentioned in the issue of April 7, was tendered the city and refused by the Thompson administration. Then it brought suit to collect this money on an implied contract for the use of the streets. If successful the sum collected presumably would not have to go into the traction fund, but presumably could have been used for general city purposes.

The Appellate Court does not decide in its opinion whether the contract ordinances have been canceled, nor does it decide whether there was an implied contract. The court does say:

"It appears, then, that the city, while averring that said ordinance has been cancelled and annulled, at the same time attempts to rely upon that ordinance to make out its claim of a contract implied in law."

The court asserts that such a position is legally impossible and therefore the suit was improperly brought, and was properly dismissed by the municipal court.

Corporation Counsel Busch said that it will be decided later whether the city will appeal the case.

Effort at Last-Minute Compromise in New York

The Assembly of New York on April 25 killed the several motions of Minority Leader Donohue to report the administration's public service and transit bills out of the rules committee for final passage, thus assuring the defeat of those measures so far as this year's session is concerned.

A conference was held later the same day at the Executive Mansion, and while nothing definite was determined as to the exact language of the compromise transit bill a ray of hope was held out that some sort of an agreement will be reached. The conference was attended by the Governor and the Republican and the Democratic leaders.

The attitude assumed by the Governor is that the city of New York with its hundreds of millions invested in subways is entitled to an honest chance to attempt to solve its own transit problem in its own way.

The State Public Service Commission will, under the proposed measure, keep a check on what the city does, will co-operate with the city of New York in all ways possible to make a success of its venture and will advise as to capitalization and service of any of the lines which may continue to be operated by the transit companies themselves.

Under the measure to be presented, the city of New York, however, is not to be permitted to engage promiscuously in the business of bus transportation, except that under certain conditions the city may obtain from the Public Service Commission a certificate of convenience and necessity for the operation of lines in conjunction with existing transportation systems or to serve new territory where either the company operating present lines of traction does not feel justified in making an extension or installing buses or the Public Service Commission does not feel that the utility is justified in investing the aditional capital so required.

All in all the new bill will be an experimental step toward complete regulation of transit facilities in the city of New York by the municipality; its success will depend on the frame of mind of the persons responsible for its enforcement. It will not give all that has been asked; it will not ruin vested interests; but it will, with all proper safeguards to the security of live capital invested, give promise of solving the present problem, if the city itself, through its administrative facilities and proper co-operation, can bring such solution about. An extra session of the Legislature seems likely.

Wage Increase Announced by Market Street Railway

The Market Street Railway, San Francisco, Calif., has announced a wage increase for platform men beginning April 29. The new scale in cents an hour is as follows:

First six months	.46
Second six months	.48
Third six months	.50
Next twelve months	.52
Thereafter	.54

This is a 4-cent an hour increase for men in their first six months of service and 2 cents an hour for all other classes. Men now on the 42-cent rate will be advanced to 46 cents for their next six months of service, after which they will enter the 48-cent class. The present rate has been in effect for a little more than six months.

Three Cents an Hour Increase in Los Angeles

An increase in pay of 3 cents an hour was made to trainmen of the Los Angeles (Calif.) Railway on April 16. The increase affects approximately 2,300 men and increases the annual payroll $200,000. The old and the new rates in cents an hour are as follows:

	Former Scale	New Scale
First three months	.46	.49
Next nine months	.47	.50
Second year	.48	.51
Thereafter	.50	.53

Safety operators on shuttle cars receive an extra 2 cents an hour and safety car operators on main lines 4 cents additional an hour. This is a continuation of the scale given safety car operators since the cars were introduced in 1920.

The increase brings the pay scale only 1 cent an hour in each class lower than the highest point reached by increases made in the after-war period of business readjustments. The scale ranging from 46 cents to 50 cents has been in effect since October, 1921. The minimum guarantee for new men is increased from $100 to $125 per month.

Mr. Storrs Praised for His Coal Plan

In urging engineers to take up with their employers and clients the advisability of securing an earlier movement of domestic coal—a step taken at the request of John Hays Hammond, the chairman of the President's Coal Commission—the Federated American Engineering Societies has addressed a letter to its member societies, of which the following is a part:

The Coal Commission is particularly impressed by the plan devised by L. S. Storrs, president of the Connecticut Company. Under that plan the employee submits, prior to April 1, an estimate of his winter fuel needs. Delivery is to be made at the option of the retail dealer during the six months period beginning with April. Full payment for the coal will be made by the company at any time delivery is effected.

The company is reimbursed by deducting the cost of the coal from the employee's salary. These deductions, however, are spread in equal installments over the six months period. Under this plan, the employer can see to it that the coal is purchased at the best possible price. He can influence the dealer to deliver the maximum practicable amount of coal early in the season. The employees, many of whom are accustomed to buying coal in very small lots during the period of highest prices and distribution difficulties, can make substantial savings and be assured of a sufficient quantity of coal when needed.

Will Fill Vacancy Immediately.—Mayor Doremus of Detroit and the Street Railway Commission will take immediate steps to secure a trained executive to fill the position made vacant by the death of Joseph S. Goodwin, late manager of the Department of Street Railways.

Financial and Corporate

Will Resume Fare Hearings

Property Valuations of Minneapolis and St. Paul Railways Up Again—City Awaits Expert's Return

The Minnesota Legislature has ended its biennial session without changing the laws governing street railways and the decks are cleared for hearings before the State Railroad & Warehouse Commission to determine proper rates of fare based on property valuations of the Minneapolis Street Railway and the St. Paul City Railway. The rate is now 6 cents for either company and 12 cents for interurban trips.

Power to make rates was granted to the commission by the Brooks-Coleman bill passed at the 1921 session, and three bills offered at the 1923 session aimed to amend or repeal this law. Had the law been repealed proceedings would have ended.

A fourth bill, which was not enacted, provided a metropolitan one-fare zone, or one fare between Minneapolis and St. Paul points, instead of two fares when city limits are crossed on interurban lines.

This latter bill was a St. Paul measure. The Minneapolis Aldermen opposed the plan on the ground that under the proposed law Minneapolis would carry the burdens of St. Paul, as figures indicated that the Minneapolis system is a profitable one and that the St. Paul system is having a hard time to make both ends meet.

These figures, prepared by D. F. Wilcox, the valuation expert, showed St. Paul's deficits to have been as follows: 1918, $157,310; 1919, $37,903; 1920, $135,216; 1921, $167,857. Minneapolis profits were: 1918, $758,259; 1919, $799,746; 1920, $870,142; 1921, $440,903; 1922, $999,284, the latter large figure being due to an increase for Minneapolis after the free fare zone extending into St. Paul about 2 miles had been abolished.

Mr. Wilcox from a survey had determined that Minneapolis is entitled to a street car fare four-fifths of a cent lower than the fare in St. Paul, on the basis of cost of service within the two cities; if the operating incomes of the two companies were pooled through the proposed consolidation so as to keep the fare the same in both cities the uniform fare would be about three-tenths of a cent higher than the fare required to support the Minneapolis service standing alone and about half a cent lower than the fare required to support the St. Paul service alone. An increase would be required of about three-tenths of a cent in fare in the two cities if the one fare rate metropolitan zone were put in.

St. Paul had conducted an investigation over a long period with the findings that a single fare for the two cities would create a labor market ideal for all industries in both cities, would save $600,000 annually to interurban riders of the two cities, would expand the western district of St. Paul into a greater manufacturing center, would make the show places of both cities available at one fare, and would reduce operating expenses of the street railways by unification of lines.

An agreement is to be reached at once between all concerned as to the date in May when the hearing will begin before the commission. The commission and the Minneapolis Street Railway are ready and it is understood that as soon as Mr. Wilcox returns from Denver the city will be ready to present its arguments.

Income and Traffic Increase in Detroit

The total operating revenue of the Department of Street Railways, Detroit, Mich., for the thirty-one days ended March 31, 1923, was $1,851,535, against $1,619,266 for the month of February. The revenue from transportation amounted to $1,755,955 for March, compared with $1,528,539 in February. Total operating expenses advanced from $1,185,779 in February to $1,339,794 in March. The net revenue in March was $511,741, against $433,487 in February. The net income showed an increase of $57,191, being $98,025 in March. The total passenger traffic in March was 43,227,309 and in February 37,707,665.

Valuation Hearings Resumed

The Public Service Commission has resumed hearings on the valuation of the physical properties of the International Railway, Buffalo, N. Y. The figures introduced at the hearing will be used as the basis of the rate hearing to be held at a later date. The city has complained against the 7-cent fare or four tokens for 25 cents. It seeks the restoration of the 5-cent fare. The company has filed a value of $96,539,185 and the commission has been taking testimony to determine whether or not the figure is excessive. From the Buffalo city line to the villages of Depew and Lancaster the value of the company's right-of-way amounts to $29,269, according to E. A. Chamberlain, Buffalo real estate expert. Buildings not used in operation of the railway which were purchased with the land were appraised at their commercial value at $58,850. The company's total land holding and rights-of-way were valued at $3,957,717, and William M. Raignel, in charge of grading, tracks, bridges, culverts and crossings, fences and signs, testified that the value of the grading amounted to $3,741,887.

Good Showing in March

Community Traction Company Reports Surplus of $20,000—New Wage Demands Made

Operations of the Community Traction Company, Toledo, Ohio, for the month of March, as reported to the board of control at the meeting on April 15, shows the most successful financial results since the enactment of the ordinance more than two years ago.

A surplus of $20,449 from operations and $505 interest on cash balance was credited to the fare stabilizing fund, bringing it to a total of $237,110, with its deficit reduced to $162,890. In various other operating reserves and funds there were cash balances of $39,636, and in addition to the $364,000 of Community Traction Company stock owned by the city now there was a cash surplus in the sinking fund available for the redemption of more bonds for the city amounting to $101,077.

The March credit to the stabilizing fund was exceeded by that made for December, 1922, but additional maintenance and depreciation charges made in March when considered show March more favorable by $6,159 than December.

The average daily riding has grown to 187,539 from its low point of 148,658 in August, 1921.

Gross revenue for March amounted to $353,768, an increase of $45,941, or 14.92 per cent, over the same month of last year. Operating expenses of $245,966 represent an increase of $32,318, or 15.12 per cent increase over the same month a year ago. Increased car mileage is largely responsible for the rise in costs. There were operated 660,971 car-miles in March, as compared with 639,656 for the same month last year.

The first half of April shows that business is continuing very near the March level. A few days of bad weather brought the results down a trifle.

The company will be called upon to negotiate new contracts with interurban lines for trackage rentals on May 1 and a new wage contract has been submitted to take the place of the present agreement, which expires on May 21.

The platform men and shop men have asked for increased wages, but the amount demanded has not been announced to the public.

New Reorganization Plan Means Capital Reduction

Under the terms of the reorganization of the United Gas & Electric Corporation, New York, N. Y., first preferred shareholders of the present company will receive seven shares of common and seven shares of preferred in the new company for each ten shares held. Second preferred shareholders will receive common stock of the new company on a share for share basis. The new common is of $10 par value. Holders of the present common stock will receive one share of the new stock

for every three shares held. The common stock of the Berkshire Corporation, a concern controlling three electrical companies operating in Lancaster County and included in the reorganization, having no preferred, will be exchanged on a share for share basis with the common stock of the new company.

The new company will have an outstanding capitalization of $6,499,360 preferred and $2,404,636 common, making a total of $8,903,996. The new preferred stock will be preferred both as to dividends and assets in liquidation, and will draw 5 per cent cumulative dividends the first two years, 6 per cent cumulative dividends for the succeeding two years, and 7 per cent cumulative dividends thereafter. It will be redeemable in whole or in part at the option of the corporation at $105.

Outlook for British Columbia Electric Railway Improved

The gross earnings of the British Columbia Electric Railway, Vancouver, B. C., for the year ended June 30, 1922, show a decrease of $124,299 as compared with the previous year, due mainly to a decrease in passenger and freight traffic. This has been offset, however, to some extent by economies in operating expenses and also by an increase in the revenue from gas and lighting, so that the net revenue showed a decrease of only $58,409. The sales of electricity constituted a record in the history of the company. The company is well equipped to take care of the demand for light and power.

J. Davidson, who presided at the meeting of the company in London on Jan. 22, explained in reading the remarks of R. M. Horne-Payne that through the purchase in 1920 of the undertaking of the Western Power Company of Canada the company had a large reserve of water-power resources available for development to meet the demands for electric power for many years to come. He said that a large increase in the volume of water at Stave Lake will be obtained by diverting the waters of Lake Allouette. In addition the company expects to be able to obtain as much as 80,000 hp. from the development of a second water power site lower down on Stave River. Plans for this development are in course of preparation.

Notwithstanding a year full of difficulties the company was able to show results which made it possible to recommend the declaration of final dividends of 18s. 8d. per cent on the preferred ordinary stock and £2 9s. 8d. per cent on the deferred ordinary stock, both free of income tax, making, with the interim dividend already paid, total dividends for the year of £4 13s. 8d. per cent free of tax on the preferred ordinary stock and £6 4s. 8d. per cent free of tax on the deferred ordinary stock.

In referring further to the annual report of the company, Mr. Davidson said that as was the case last year the revenue shown on the profit and loss account did not include any profit on exchange derived on the remittance of money from Vancouver to London, such profit being of an exceptional character. The net profit on exchange has been carried direct to the reserve fund. This is considered a wise measure because it is impossible to forecast how long the company may derive any advantage from this source. Should it become necessary to remit money on capital account from London to Vancouver before the rate of exchange becomes normal the premium on the dollar may be a disadvantage to the company, against which contingency the present profit on exchange forms a useful reserve.

In referring to the fare situation at Vancouver, of which mention has been made previously in the ELECTRIC RAILWAY JOURNAL, Mr. Davidson said that the bill which the provisional Legislature had passed to provide for the regulation of passenger rates chargeable to the company would, through the appointment of a commissioner, provide a peaceful and it was believed equitable means for the settlement of fares in any municipality or district served where the company and authorities concerned were unable to arrive at a mutual agreement.

He said that he was glad to be able to report that an agreement had been reached with the city of Vancouver establishing the fare in the city at 6 cents for a further period of three years from Nov. 8, 1922, and providing that either party should be entitled at the end of three years to have the fares then charged revised by mutual agreement or, failing mutual agreement, by arbitration.

He took occasion to express appreciation of the reasonable and fair attitude displayed by the Legislature of the province and the Council of the city of Vancouver in arriving at a settlement of these matters. He said that the announcement which he made would go far to remove the feeling of distrust with which Canadian investments are unfortunately at the present time looked upon by British investors and would make it possible when the time came to raise capital not only for the development of this enterprise but also for the other Canadian enterprises.

The company has built up at Vancouver and vicinity an enterprise at a cost of $59,000,000. He explained that the company was preparing for the benefit of the shareholders and those interested in it an illustrated booklet, as it was felt that the enterprise had grown to such an extent that many of the shareholders themselves did not quite understand the great value of the property which they own. It was expected that this booklet would be ready in the course of a few months. The intention is to send a copy of it to every shareholder.

Maine Railroad Does Better in 1922

The Cumberland County Power & Light Company, Portland, Me., experienced a good year during 1922. The surplus for the year was $368,672 as compared with $344,624 for the previous year. The deficit of the Portland Railroad, leased by the company, was $4,913 in 1922 compared with $62,796 in 1921.

The company, about Nov. 1, 1922, according to program, completed the new steam station with two 5,000-kw. units installed. This plant has operated efficiently and is altogether very satisfactory. The company is, however, still confronted with the necessity of continuing the expansion of its power

	Latest	Month Ago	Year Ago	Since War High	Since War Low
Street Railway Fares* 1913 = 4.94	Apr. 1923 **6.89**	Mar. 1923 **6.89**	Apr. 1922 **7.14**	May 1921 **7.24**	Apr. 1923 **6.89**
Street Railway Materials* 1913 = 100	Mar. 1923 **174**	Feb. 1923 **174**	Mar. 1922 **156**	Sept. 1920 **247**	Sept. 1921 **156**
Street Railway Wages* 1913 = 100	Apr. 1923 **207**	Mar. 1923 **207**	Apr. 1922 **212**	Sept. 1920 **232**	Apr. 1923 **207**
Steel—Unfilled Orders (Million Tons) 1913 = 5.91	Mar. 31 1923 **7.40**	Feb. 28 1923 **7.28**	Mar. 31 1922 **4.49**	July 31 1920 **11.12**	Feb. 28 1922 **4.14**
U.S. Bank Clearings Outside N. Y. City (Billions)	Mar. 1923 **15.43**	Feb. 1923 **13.22**	Mar. 1922 **12.78**	March 1920 **18.54**	Feb. 1922 **10.65**
Business Failures	Mar. 1923	Feb. 1923	Mar. 1922	Jan. 1922	Sept. 1922
Number	**1,696**	**1,563**	**2,297**	**2,722**	**1,469**
Liabilities (millions)	**48.98**	**38.15**	**61.77**	**105.7**	**31.92**

Conspectus of Indexes for April, 1923

Compiled for Publication in this Paper by

Albert S. Richey

Electric Railway Engineer

Worcester, Mass.

	Latest	Month Ago	Year Ago	Since War High	Since War Low
Eng. News-Record Construction costs 1913 = 100	Apr. 1923 **213.5**	Mar. 1923 **205.2**	Apr. 1922 **164.7**	June 1920 **273.8**	Mar. 1922 **162.0**
U.S. Bur. Lab. Stat. Wholesale Commodities 1913 = 100	Mar. 1923 **159**	Feb. 1923 **157**	Mar. 1922 **142**	May 1920 **247**	Jan. 1922 **138**
Bradstreet's Wholesale Commodities 1913 = 9.21	Apr. 1 1923 **13.93**	Mar. 1 1923 **13.93**	Apr. 1 1922 **11.53**	Feb. 1 1920 **20.87**	June 1 1921 **10.62**
Dun's—Wholesale Commodities 1913 = 120.9	Apr. 1 1923 **193.1**	Mar. 1 1923 **191.2**	Apr. 1 1922 **166.3**	May 1 1920 **263.3**	July 1 1921 **159.8**
U.S. Bur. Lab. Stat. Retail food 1913 = 100	Mar. 1923 **142**	Feb. 1923 **142**	Mar. 1922 **139**	June 1920 **219**	Mar. 1922 **139**
Nat. Ind. Conf. Bd. Cost of living 1914 = 100	Mar. 1923 **159.2**	Feb. 1923 **157.5**	Mar. 1922 **154.7**	July 1920 **204.5**	Aug. 1922 **154.5**

*The three index numbers marked with an asterisk are computed by Mr. Richey, as follows: Fares index is average street railway fare in all United States cities with a population of 50,000 or over except New York City, and weighted according to population.

Street Railway Materials index is relative average price of materials (including fuel) used in street railway operation and maintenance, weighted according to average use of such materials. Wages index is relative average maximum hourly wage of motormen and conductors on 105 street and interurban railways in the United States, operating more than 100 passenger cars each, and weighted according to number of cars.

capacity, owing to the rapid growth of the power and lighting business, accelerated, undoubtedly, by the high price of coal. The directors now have in contemplation several plans for proceeding with the development of power production, including among others the consideration of doubling the capacity of the new steam station immediately and adding to the hydro capacity.

The operations of the Portland Railroad improved during 1922, and despite a small falling off in gross revenue, as compared with 1921, expenses decreased, so that as noted previously the deficit for the railroad for the year 1922 was $4,913 as against $62,796 for 1921. In the cost of service of the railroad is included operation, maintenance, taxes, depreciation, interest on the bonded debt and the 5 per cent guaranteed dividend upon its common stock. The railroad therefore in 1922 earned $95,037 of the total $99,950 of dividends upon its common stock. No increases in fares were made during 1922 nor have any increases been made in the power and lighting rates, which remain on a pre-war basis.

STATEMENT OF PORTLAND RAILROAD FOR YEARS ENDED DEC. 31.

		1922	1921
Gross income		$1,668,239	$1,696,279
Operating expenses	$1,220,276		
Taxes accrued	105,328	1,325,604	1,410,402
Gross income less operating expenses and taxes		$342,635	$285,877
Deductions from income		247,598	248,723
Net income		$95,037	$37,154
Dividends		99,950	99,950
Deficit		$4,913	$62,796

The comparative combined results of the operation of the Cumberland County Power & Light Company and subsidiary and leased companies, namely, York County Power Company, Westbrook Electric Company and Portland Railroad, with inter-company items of earnings and expenses eliminated, for the years ended Dec. 31, 1921 and 1922, were as follows:

		1922	1921
Gross income		$3,467,564	$3,305,110
Operating expenses	$1,940,488		
Taxes accrued	295,077	*2,235,565	2,242,835
Gross income less operating expenses and taxes		$1,231,999	$1,062,275
Deductions from income		719,472	697,876
Net income		$512,527	$364,399
Preferred stock dividends		159,646	241,500
Surplus		$352,881	$122,899

* For the year ended Dec 31, 1922, the sum of $229,200 was included in the item of operating expenses for depreciation.

Railway Securities at Auction

Electric railway securities sold at auction by A. H. Muller & Sons, New York, on April 26 were as follows:

$11,000 South Carolina Gas & Electric Company first mortgage 6 per cent bonds, due 1942; 72⅝ per cent.
60 shares Cities Service Company preferred B; $5¼ per share.
$8.50 Cities Service Company common cash scrip; $21.25 Cities Service Company common cash scrip; $5 Cities Service Company preferred stock scrip; $36 lot.
$4,000 Brooklyn Union Elevated Railroad Company first mortgage 5 per cent bonds, due 1950, coupons, February and August; 82¼ per cent.

Two Utah Interurban Properties Made Money in 1922

The annual statements of electric interurban railroads operating in Utah have been filed with the Public Utilities Commission. The statements showing the results for 1922, follow:

Bamberger's Electric Railroad

The Bamberger Electric reports an operating revenue of $570,000, of which $421,500 is from its passenger service and $105,500 from its freight service, with $35,000 additional from express and various small items making up the remainder. Decreases are shown in each item of revenue except from baggage, and total approximately $73,500. However, the operating expenses of $406,000 for the year show a decrease of $153,000 as compared with the year 1921.

From the net revenue from railway operations the company paid nearly $40,000 in taxes. Other principal outlays were $72,000 in interest on funded debt, $13,000 on unfunded debt, and from the balance, which was transferred to profit account, the railroad paid a preferred stock dividend of $30,000. Some other expenditures, including nearly $11,000 in adjusting accounts with the Ogden Terminal Company, left a net increase in the corporate surplus for the year of a little more than $5,000. No dividends were paid on common stock. Depreciation and operating reserves for the year were increased by about $67,000. The books indicate an investment in road and equipment of about $3,720,000.

Utah-Idaho Central Railway

The Utah-Idaho Central shows a book investment in road and equipment of $5,600,000, with a depreciation set up during the year of $12,000. Its operating revenue of $822,000 was $111,000 less than last year, while its operating expenses of $514,000 were $149,000 less than last year. The net revenue from railway operations, therefore, $308,000, was $39,000 more than in 1921. Taxes amounting to more than $70,000 were the first charge against this. The company received as contributions during the year one year's interest on certain bonds and convertible notes amounting to $37,000. Thus, the total gross income, after deducting operating expenses, was $375,000. Interest charges, however, were $311,000, so that the company realized a loss of $36,000 during the year, and paid no dividends.

The company's passenger revenue during the year, close to $350,000, was $40,000 less than in the previous year, and its freight revenue of $375,000 showed a falling off of $88,000 as compared with 1921. There was an increase of $10,000 in express revenue.

Salt Lake & Utah Railroad

The Salt Lake & Utah Railroad, generally known as the Orem Electric Railroad, made a net income of $70,383 for the year 1922, as against $29,824 for 1921. The figures show a gross income for last year of $753,797, which is $43 more than that of 1921. There is a big drop in operating expenses, however, this having been $526,278 for 1922 as against $568,715 for 1921. This leaves a net revenue of $227,518 for 1922 in comparison with $185,040 for 1921. The interest charges for 1922 were $157,136 and those in 1921 were $155,216.

Charges for amortization of discount and miscellaneous debits dropped from $15,558 in 1921 to $8,686 for 1922, and $18,087 is charged to depreciation in 1921 and $18,546 in 1922. These figures leave a balance on hand for the year 1922 of $43,151 as against a deficit for 1921 of $3,821.

Receiver Operating Property.—The St. Albans & Swanton Traction Company, St. Albans, Vt., is being operated under the direction of Receiver P. E. Sullivan.

Brooklyn Foreclosure Sale Set for May 11.—The properties of the Brooklyn (N. Y.) Rapid Transit Company are scheduled to be sold under foreclosure on May 11. This is another step in connection with the reorganization of the company.

Dividend Declared—The trustees of the Eastern Massachusetts Street Railway, Boston, Mass., have declared an initial dividend of 2½ per cent in cash on the adjustment stock. The dividend will be payable May 15 to holders of record on May 1.

Net Income of $360,095.—The Market Street Railway, San Francisco, Calif., for the three months ended March 31, 1923, reports a railway operating revenue of $2,374,439 and operating expenses of $1,696,090. The net income realized was $360,095.

Railway Buys Property.—Contracts have been made for the sale to the Public Service Corporation of New Jersey of the property adjoining its home office and railway terminal in Newark. The purchase was made to take care of the growing needs of the business.

Denies Right to Abandon Line.—The Interstate Commerce Commission recently denied the application of the Boise (Idaho) Valley Traction Company to abandon a line of railroad in Ada County, Idaho, extending from Onweiler's Junction to McDermott, a distance of approximately 4 miles.

Trustee Appointed.—The Federal court has appointed C. G. Taylor of Lima, Ohio, as trustee to reorganize the Lima & Defiance division of the former Ohio Electric Railway. The Lima & Defiance Railroad, the new company, will operate a line 42 miles long built over a private right-of-way between the two cities.

Offer Portland Bonds.—National City Company and Halsey, Stuart & Company are offering an additional issue of $2,000,000 of first lien and refunding mortgage 6 per cent gold bonds of the Portland Railway & Light Company, Portland, Ore. The price is 94½, to yield 6.45 per cent. The bonds are dated May 1, 1922, and are due in 1947.

Traffic and Transportation

Recommends Return of Higher Fare in Seattle

In a report to the City Council, George F. Russell, superintendent of public utilities, recommends a return to the 8½-cent carfare on the Seattle Municipal Railway lines. Mr. Russell also recommended a draft on the general fund to help meet railway expenses, but the City Council refused to consider such a plan.

In the report, Mr. Russell comments on economies that he believes will greatly reduce operating expenses, among them being the use of one-man cars.

He states that forty-five cars were converted last year, and that the department hopes to convert seventy-five cars this year. The report recommends the discontinuance of the Youngstown and Ray Street shuttle, stating that it will save $17,500 a year. The report also calls attention to the law passed by the recent Legislature allowing the organization of improvement districts for the payment of street car line extensions by bond issues, and says that many neighborhoods are becoming interested in the plan, which will bring further relief to the street railway system. The cost of extensions last year is placed at $70,000.

In discussing the matter of the failure of the 5-cent fare to attract many additional riders Mr. Russell said:

> We do not believe that a single automobile owner left his car at home to ride in the cars because of this reduction. Nor is there any reason to think there has been increased interest shown by the people to stimulate increased patronage. No serious hardship has been worked upon the system by this trial, nor has anyone suffered any loss. While it is true that the rate has been in effect but forty days, there is enough evidence in hand to show the car riders are not sufficiently in favor of a 5-cent fare to ride enough to cover the loss in receipts occasioned by the drop.

Buses for New York State Railways

The New York State Railways, Rochester, N. Y., is going into the bus business in earnest. This is shown by the fact that orders for twelve buses were placed during the week ended April 21 and that on April 24 officers were elected of the Rochester Railways Co-ordinated Bus Lines, Inc., and the Utica Railways Co-ordinated Bus Lines, Inc., both recently incorporated under the laws of the state of New York.

The buses are scheduled for delivery late in June. They will be of the twenty-five passenger type, Brockway chassis with Kuhlman bodies. Five are of the trolley bus type for use on Dewey Avenue, Rochester, and seven are gasoline vehicles which will be distributed in various cities. The gasoline service proposed for Rochester is an extension of the Dewey Avenue rail line, into the adjoining town of Greece. In Utica service is planned across town, east to west, over the Parkway. Bus developments by the same interests are pending also in the cities of Syracuse and Schenectady.

Higher Fare Suggested

Committee of Shreveport Citizens Suggests Return of 8 per Cent on Invested Capital

The Shreveport (La.) Railways is entitled to a net return of 8 per cent on its invested capital. This is the opinion of a committee of citizens of Shreveport appointed by Huey P. Long, chairman of the Public Service Commission of Louisiana, to investigate the affairs of the company, and recommend action that would improve the service rendered. The committee has submitted its report to Commissioner Long.

The committee also recommended to the Mayor that an ordinance be enacted outlining regulations for the operation of jitneys and that operators be required to follow designated routes and maintain fixed schedules. A bond of $10,000 is also suggested as a requirement to be exacted from each jitney operator.

The committee's investigation was made in connection with the hearing on the traction company's petition for an increase in fares from 5 cents to 7 cents. The chairman of the committee was Major V. Grosjean.

After recommending that additional cars be placed in service on several lines and that extensions be built on the State Fair Grounds line to the United States Sheet & Window Glass Company's plant at Jewella, the committee presented an analysis of the company's earnings under the present 5-cent fare and showed what earnings probably would be under a 6-cent fare. The committee finds that for the year ended Dec. 31, 1922, the operating expenses of the company totaled $536,067. If to this sum there was added the increased operating costs arising from the proposed increase in service, the total operating cost would be $590,309. This would leave a net revenue for the company of $39,769, or a return of 1.78 per cent on the $2,244,163 physical valuation of the property now owned by the company and as increased in the recommendations for extensions.

On a 6-cent fare the committee presents the deductions that the income from 11,919,602 passengers (during 1922 the company carried 10,837,513 passengers, and it is claimed the extensions would add 1,092,089 passengers) would be $715,176; income from school tickets $32,698; income from advertisements $1,400, making total income $749,274. Operating costs for the year are estimated at $590,309. This would leave a net return of $158,965, or 7.08 per cent on the invested capital.

Gorgeous Elevated Cars in the Spring, Tra-La

The first orange colored elevated train of the Manhattan Elevated Railway, New York, N. Y., burst upon the New York sky line on April 24. For several days previous to the operation of the first repainted car whispered hints had emanated from I. R. T. creators of transit fashions that orange trimmed with black would be the *dernier cri*, as the *Tribune* put it, for elevated trains this spring.

President Hedley of the Interborough Rapid Transit Company, which operates the elevated lines under lease, explained at the time of the operation of the first newly-painted train that, after trying several shades of blue and red, orange finally had been selected as the best color to repaint all the elevated cars. It was found to be the most sanitary, he declared, and in the long run, the most economical.

The cars are being reconditioned at the rate of twenty-one a week, so that it will require nearly two years to finish painting the rolling stock now in commission. The ceilings of the cars are to be a glazed white, which will add 25 per cent to the illumination at night. There will, however, be no decrease in the quantity of artificial illumination.

Besides Mr. Hedley, the "Goldenrod," as the new trains have been popularly named, on its maiden trip carried W. L. Pepperman, vice-president of the Interborough; H. H. Vreeland, director of welfare; S. V. Smith, superintendent of elevated railways; A. L. Merritt, superintendent of subways; G. H. Pegrim, chief engineer, and other officials.

The train left Rector Street at 11:36 a.m. and went as far as 155th Street. It went at once into the regular schedule.

The writer of the account contained in the *Tribune* of the running of the new train said in part:

> The sophisticated zephyrs that ventilate the financial district became audible with astonishment yesterday when what at first sight they must have taken for a flight of yellow taxis swept grandly up the Sixth Avenue "L" tracks from South Ferry, and came to rest at the Rector Street station. It was the Goldenrod Limited!
>
> Frank Hedley, president of the Interborough, with one hand resting negligently upon the controller, which had just been relinquished to him by the motorman for pictorial purposes, stuck his head out of the cab and graciously permitted the cameramen to do their stuff. Traction officials, reporters, and a few dazed patrons of the Elevated Railroad clambered aboard. Mr. Hedley gave place to Mr. McGuire, the motorman. The Goldenrod, redolent of very fresh paint, and bearing on its brilliant sides the legend "Fresh Air Line," resumed its gorgeous progress.
>
> Notwithstanding these announcements, when the Goldenrod paused at the Eighth Street station, Greenwich Villagers were heard to tell one another excitedly that if elevated trains were to be decorated like Village tearooms that nourish Village genius, the debasement of Art—with a capital A—in America was complete. At Herald Square, a small boy informed the platform at large that the Goldenrod must be President Harding's special train, and declined to embark until promised by the guard that he would not be arrested.

The management of the Interborough company has issued a twenty-one-page pamphlet entitled "The New Rapid Transit Problem," in which it explains, in an open letter to the public of New York City, the railway's position rela-

tive to the public needs. The company has also issued a small circular entitled "Ride on the Open Air Elevated," which will be of special interest to baseball fans as it contains a list of the ball games to be played in New York during the coming season.

It also contains a map of the I. R. T. elevated lines and other special features pertaining to the service.

Suggests Ten Rules for Safety

According to the Wisconsin Public Utilities Bureau ten safety rules suggested by studies of the cause of automobile-street railway collisions in Wisconsin have been proposed by B. W. Arnold, chairman of the electric railway section of the Wisconsin Utilities Association.

To illustrate the need of closer cooperation between users of the streets with the view of checking the increasing number of accidents, Mr. Arnold quoted statistics compiled by R. M. Howard, vice-president of the Wisconsin Railway, Light & Power Company, showing that more than 50 per cent of the street railway accidents in Wisconsin are automobile-street car collisions.

Mr. Arnold suggested that every railway send the following ten safety suggestions to motor car owners in their territory:

1. Make sure street car is not coming when starting out from the curb.
2. Do not trail street car too closely.
3. Cross crossings cautiously.
4. Be watchful of street car making curve so as not to be hit by the swing of the rear end.
5. Avoid parking cars near street car curves in narrow streets so as not to be caught "in the pinch."
6. Avoid speeding to get ahead of street car when other cars are parked at the curb.
7. Avoid crossing in rear of street car. Other cars, unseen, may be coming in the opposite direction.
8. To get ahead of street car, make sure it is well to the rear before cutting in front.
9. Observe the law and do not pass street car while it is taking on or discharging passengers.
10. When parking at curb in narrow streets, be sure there is plenty of room for street cars to pass.

Mr. Arnold said that the total number of automobile-street car accidents in Wisconsin in 1922 was 5,780; in 1918, 3,497. Further that the records show fully 90 per cent of the collisions were caused by motorists running into street cars.

Bandits Get $400 in Trolley Holdup.—Three bandits held up the crew and seven passengers of a Pittsburgh (Pa.) Railways car near West Alexander shortly before midnight on April 23. After pulling the trolley from the wire and throwing the car into darkness they robbed the occupants of the car of more than $400 in cash and jewelry.

Through Routes and Intrastate Rates Given.—The Michigan Public Utilities Commission on April 12 at Lansing reinstated its former order giving the village of Dewitt through routes and intrastate rates. The defendants in the case were the Michigan United Railways and five steam properties. The ruling of the commission follows the order of the Interstate Commerce Commission.

Traffic Survey Made.—John A. Beeler has submitted his report of the electric railway situation in New Orleans, La. He says that the present system cannot take care of the increase in territory, since no extensions have been made since 1915. Among the recommendations is a new track layout calling for the elimination of 37 miles now in use and installation by way of extensions at other points of 34 miles.

Appeals for Railway Patronage.—The Oregon Electric Company, operating in the Willamette Valley of Oregon, has made an appeal to the merchants and other business men in the valley reminding them that continued patronage of truck lines in preference to the railway will mean that the company must go into the hands of the receiver.

Extends Transfer Privileges.—The Public Utilities Commission has issued an order increasing transfer privileges between the Washington Railway & Electric Company and the Capital Traction Company in the northwest section of Washington, D. C. The order became effective on April 1. The order was in the form of an amendment to the permit under which the Washington Railway & Electric Company operates motor buses on Park Road.

Eight-Cent Fare Upheld.—As a result of a recent decision of the State Supreme Court of Pennsylvania the 8-cent fare on the lines of the Scranton (Pa.) Railway is upheld. The court approved the ruling of the Pennsylvania Public Service Commission in placing a valuation of $9,000,000 on the property as a basis for the 8-cent fare. The city of Scranton appealed against the ruling of the commission more than a year ago and this decision is the result.

Better Service Promised Improvement Club.—The Tacoma Railway & Power Company has promised a trial of fifteen-minute service on the South Tacoma Avenue line, Division Avenue to Center Street, as first fruits of the campaign for better service on the Avenue by the Tacoma Avenue Improvement Club, which started eighteen months ago. The club will endeavor to secure the routing of the Tacoma Avenue cars beyond Center Street across the bridge to South Tacoma.

Applies for Bus Rights.—The Trenton & Mercer County Traction Corporation, Trenton, N. J., has applied to the Trenton City Commission for permission to operate buses on Olden Avenue and also one line to start from the Murray Company plant in East Trenton and through Greenwood Avenue to Front and Montgomery Streets in the heart of the city. Rankin Johnson, president of the traction company, in making application before the commission said that his company was anxious to serve the people living on streets where no trolley cars were operated.

Council Rejects Bus Franchise.—The City Council of Buffalo by unanimous vote rejected the application of the International Railway for an exclusive franchise to operate motor buses in Delaware Avenue to the Buffalo city line at a 10-cent fare and 3-cent transfer charge. The City Council also deferred action on the company's application for a bus franchise in Bailey Avenue at a 7-cent fare with free transfers. Merchants and property owners along Delaware Avenue pleaded with the municipal authorities for the issuance of a bus franchise to the International Railway or any other responsible company. The City Council believed that a 10-cent fare and 3-cent transfer charge to cars of the International Railway were too high and the International was asked to adopt the universal 7-cent fare with free transfers on its bus line, the same as the local traction lines.

Fair Grounds Fare Discussed.—The decision of the Minnesota Supreme Court filed April 20 in what is known as the State Fair rate case has a bearing on the interurban fare between Minneapolis and St. Paul. The Twin City Rapid Transit Company got permission from the Minnesota Railroad & Warehouse Commission to put in a one-rate fare between Minneapolis and the State Fair grounds, 12 cents being the regular rate. The Fair ground gates are nearer St. Paul than Minneapolis and are within the one-fare zone from that city, and the city got a restraining order from Judge F. M. Catlin of the Ramsey District Court on Aug. 12, just before the Fair. It is now about eight months since the commissioners appealed to the Supreme Court for aid, and it is significant that the decision did not appear until after the Legislature decided not to repeal the state law under which the commission has the electric railway rate-making power. Notwithstanding its attitude in the State Fair rate matter St. Paul subsequently prepared a bill to make the two cities a one-fare metropolitan area, a bill which was not passed.

I. C. C. Must Pass on Interchange Book.—Inquiries having been received by the Central Electric Traffic Association from various electric carriers indicating that they might possibly wish to honor the new non-transferable interchangeable steam railroad book, the association took up the question with the Central Passenger Association to ascertain whether or not electric carriers could be made a party to a steam railroad tariff covering this ticket, and if it would be permissible for the electric carriers to honor the ticket without selling the same. The reply from Chairman Fox of the Central Passenger Association indicates that it is the individual conclusion of the members of the association that the book arrangement be not made applicable interchangeably with electric lines operating in the Central Passenger Association territory. The federal court at Boston on April 23 issued an order enjoining the I. C. C. from enforcement of its order and relieving the railroads from the obligation of placing interchangeable mileage tickets of a face value of $90 and good for 2,500 miles on sale at $72.

Personal Items

Michigan Railroad Men Promoted

F. W. Brown New General Superintendent—All Men Promoted Have Risen from Ranks—Officers' Careers Reviewed

FOLLOWING the resignation of Harro P. Harrsen as assistant general manager of the Michigan Railroad, Grand Rapids, Mich., operating 159 miles of interurban railway, a number of changes were made in the personnel of the company. F. W. Brown, formerly traffic manager, was made general superintendent of the western and northwestern divisions; J. H. Weldon, formerly chief of the traffic bureau, was made traffic manager; O. J. Hansen, formerly chief clerk, was made superintendent of the western division; J. C. Taylor, formerly trainmaster, was made superintendent of the Northwestern division, and C. P. Gerth, formerly local freight agent, was made chief of the tariff bureau. Mr. Harrsen, it will be recalled, resigned from the company to become connected with the Electric Bond & Share Company, New York.

FREDERICK W. BROWN

Mr. Brown gained his first railroad experience at the age of twenty-two as a telegraph operator. After long service with steam roads he accepted his first position with an electric railway. This was in 1907. He went to Jackson, Mich., as general freight and passenger agent for the Michigan United Railways. In 1913 he was made superintendent of the Michigan & Chicago Railroad.

Inasmuch as Mr. Brown's service since 1907 has been confined exclusively to roads which were the predecessors or forerunners of the present Michigan Railroad system, it almost may be said that he has been with his present company for sixteen years. Both the Michigan & Chicago Railroad and the Michigan United Railways later became part of the present Michigan Railroad.

In 1915 Mr. Brown was appointed superintendent of the Western Division of the Michigan Railway and continued in this capacity until the amalgamation of this and the other properties into the Michigan Railway Lines, at which time he was made traffic manager of the consolidated Michigan Railway Lines. Mr. Brown remained traffic manager until the recent resignation of Mr. Harrsen. He was then promoted to the position of general superintendent of the Western & Northwestern lines of the Michigan Railroad.

During the war he also was acting general superintendent in addition to traffic manager, and in 1920 was made acting assistant general manager owing to the enforced absence of that official. At one time, therefore, he was solely responsible for the execution of all the duties connected with these three offices.

In electric railway circles throughout the Middle West Mr. Brown is given most of the credit for demonstrating the practicability of the transportation of freight electrically. It was he who conceived the idea of developing the freight end of the business and advanced as his solution of the congestion problems which immediately presented themselves the contention that freight trains should be moved at night, when the tracks and equipage were not in use for passenger service.

Mr. Brown was born on a farm near Battle Creek, Mich., in 1871. Until he was fifteen years old he lived the usual rugged life of the early Michigan farm lad. When he had reached the age of fifteen, his parents moved to Olivet, Mich., and it was there that Mr. Brown secured his education. Shortly after his family had settled in Olivet, Mr. Brown was enrolled in the local high school and upon his graduation, four years later, he entered Olivet College, completing his course there in 1892. It was then that Mr. Brown struck out for himself and commenced railroading. Mr. Brown's sympathetic understanding, his kindliness and cordiality have made him one of the most highly respected and genuinely liked men in Middle Western electric railway circles.

Frederick W. Brown



JAMES H. WELDON

Mr. Weldon was born in the village of Farmer, Ohio, in 1875 and received his education there. In 1898, when he was twenty-three years of age, he, like Mr. Brown, became a telegraph operator for the Lake Shore & Michigan Southern Railway. Later, while in steam railroad work at Lansing, he became acquainted with Mr. Brown, and the two have been closely associated most of the time since then.

In 1909 Mr. Weldon entered electric railway work with the Michigan United Railways as chief clerk in Mr. Brown's office, remaining there until September, 1913. At that time the Allegan division was taken over from the Michigan Central and Mr. Weldon was made chief of tariff bureau, which position he occupied until his promotion to traffic manager of the present Michigan Railroad in December, 1922.

Mr. Weldon is considered by his associates an unusually thorough student of traffic and tariff problems. The institution of various Interstate Commerce Commission rulings and the formulation of other problems relating to this phase of the business have re-



James H. Weldon



Olaf J. Hansen



J. Claire Taylor



Carl P. Gerth

quired the utmost application and care in their solution and Mr. Weldon's disposal of them has been considered particularly efficient.

OLAF J. HANSEN

Mr. Hansen was born at Holland in 1884. In 1906, after graduating from high school, he entered the employ of the Grand Rapids, Holland & Chicago Electric Railway as a motorman. He was promoted successively to the position of bonding foreman, then carhouse foreman and later inspector. Until 1916 he occupied the last mentioned position, and then was made trainmaster of the Northwestern division of the Michigan Railway lines. Following the signing of the armistice Mr. Hansen, who in the meantime had entered military service, returned to Michigan and resumed his connection with the Michigan Railway as trainmaster of the Western division of the Michigan Railway lines.

After a short period of service in this capacity, he was appointed assistant to H. P. Harrsen, who then was assistant general manager of the Michigan Railway lines. Following the reorganization in December, 1922, Mr. Hansen became superintendent of the Western division, which office he at present occupies, working under General Superintendent F. W. Brown.

Among his associates Mr. Hansen has the reputation of being a "crank" on schedules, insisting always that his trains get off right on the dot unless strict adherence to the timetable is impossible.

J. CLAIRE TAYLOR

Mr. Taylor was born on a farm in Allegan County, Michigan, in 1881. He started railroading as a motorman on the Grand Rapids, Holland & Chicago electric line, where he made Mr. Hansen's acquaintance and they became warm friends. Mr. Taylor served also as conductor on this line.

In 1910 he was made train dispatcher on the Grand Rapids, Holland & Chicago line, which office he occupied until 1913, when he was promoted to the position of trainmaster. After three years as trainmaster, Mr. Taylor left the service of the railway to accept a position with the United Motor Company of Grand Rapids, remaining with that company until 1918. He then reentered the employ of the interurban and was made train dispatcher on his old division. Two years later he again was appointed trainmaster and served in this capacity until his promotion to the position of superintendent of the Northwestern division, in January, 1923. All of Mr. Taylor's railway experience was acquired on the Grand Rapids, Holland & Chicago Railway, which now is a part of the system he superintends.

CARL P. GERTH

The village of Troy, Ind., was Carl P. Gerth's birthplace and 1893 was the year of his birth. After attending high school and business college he returned to Troy and entered the employ of the Southern Railway as a helper. In 1913 he was promoted to the position of switch clerk on the Southern Railway system and was stationed at Evansville, Ind. From this point his advancement was rapid. In 1914 he was made chief rate clerk for the Southern at Evansville and in 1915 was appointed chief correspondence clerk to the general freight agent of the Southern (Lines West) and was stationed at Cincinnati. In 1916 he left the Southern to become office manager for the Walsh Baking Company at Evansville, Ind. In 1917, however, he again felt the urge to get back into the game and he entered the employ of the Michigan Railway lines as relief agent at various points on the system. Three months after accepting this position Mr. Gerth was made joint freight agent for the Michigan Railway and the Detroit United Railway at Jackson.

In August, 1917, Mr. Gerth enlisted in the engineering corps of the army in the outfit with Mr. Hansen. After being discharged, Mr. Gerth returned to the Michigan Railway lines and was made district freight agent at Grand Rapids, being promoted in July, 1918, to the position of freight agent for the Michigan Railway lines in that city. Mr. Gerth continued in the office of freight agent until January, 1923, when he was made chief of the tariff bureau of the Michigan Railroad.

New Vice-President and Superintendent at Toledo

J. Frank Johnson, who has lately been appointed vice-president and general superintendent of the Community Traction Company, Toledo, is perhaps one of the youngest electric railway executives in the country.



J. Frank Johnson

He was born at Guthrie, Okla., on Aug. 5, 1890, and spent his boyhood there and at Muskogee. Before his college career he worked in all about three years as a conductor and motorman on some of the small properties at home.

Mr. Johnson is a graduate of the "cadet school" of the Doherty organization, having gone to Toledo about July 1, 1916, at the completion of his work at the University of Wisconsin, where he was graduated with the degrees of Bachelor of Science and Electrical Engineer.

From Toledo he went to Durham, N. C., and served as railway engineer with the Doherty traction property there for about a year. He was then transferred to Bartlesville, Okla., where he served as superintendent of railways for a few months. His next promotion took him to the New York offices of Henry L. Doherty & Company, where he worked as assistant railway engineer under R. F. Carbutt for a period of about six months.

In the fall of 1920 he became vice-president and general manager of the Toledo & Western Railroad, an interurban property operating between Toledo and Pioneer, Ohio, and with a branch to Adrian, Mich. When the road was petitioned into receivership on Dec. 31, 1920, he was made one of the receivers, serving through a period of critical operations, involving a strike of platform employees, until his new appointment to head the Toledo properties on April 1.

Mr. Johnson will have almost full charge of the operations of the Community Traction Company, as President Frank R. Coates spends almost all of his time in New York now.

He will rush through a schedule of $500,000 of improvements this summer and will then make preparations for carrying out $1,000,000 of new construction, extensions and betterments, as provided for in the Milner ordinance, to be undertaken in the next two and one-half years.

Dinner Tendered O. H. Simonds

O. H. Simonds, who recently resigned as vice-president and general manager of the Dubuque (Iowa) Electric Company to become connected with the Electric Bond & Share Company, New York, was the guest of honor at a farewell dinner party given by a number of his business and other associates at the Julien Dubuque Hotel. About thirty-five business and professional men attended the dinner party. In addition to Mr. Simonds, the Dubuquers had as their guests his successor, Thomas Parker, and J. Sullivan, representing the owners of the local electric company. At the conclusion of the meal Mr. Simonds was presented with a watch, chain and knife. A number of short talks were then made by the Dubuquers, who expressed their regret at Mr. Simonds' departure. Mr. Sullivan said that the owners of the Dubuque property were, indeed, sorry to lose the services of their Dubuque manager. Mr. Parker, the new manager, also made a short speech. In his remarks he referred to the plans of the company looking toward the matter of keeping abreast with the growth of the city.

W. Nelson Smith Honored for Research Work

Early in February it was announced that the Engineering Institute of Canada had honored W. Nelson Smith, M.E., consulting electrical engineer of the Winnipeg (Man.) Electric Railway, and Dr. J. W. Shipley of Manitoba University by placing their research paper on the self-corrosion of cast iron at the head of the meritorious papers presented during the year 1921-22.

Now comes the announcement that the council of the Institute had accepted the report of another committee, awarding to Mr. Smith and Dr. Shipley the Plummer Medal, offered each year for the best paper presented to the institute on a metallurgical or chemical subject, by reason of their two papers presented during 1921 and 1922 dealing respectively with the self-corrosion of cast iron and of lead.

The thoroughness of the proof that cast iron and lead pipes are subject to self-corrosion when buried in soils carrying certain salts, without any help from electric railway stray currents, has now been noted by three separate committees of the Engineering Institute of Canada.

W. A. Whitney has been relieved of the duties of purchasing agent of the Utah-Idaho Central Railroad, Ogden, Utah. He will continue as general manager. The duties of purchasing agent are being performed by A. L. Carpenter. F. L. Whitney is traffic manager of the company.

Mrs. Mabel Knight Roberts, secretary to G. J. Kuhrts, general manager of the Los Angeles (Calif.) Railway, recently celebrated her silver anniversary of service with the company and was honored with presents from executives of the railway. Mrs. Roberts has the distinction of having been secretary to every general manager the company has had.

C. D. Smith Made Superintendent of Beaver Valley Local Lines

W. H. Boyce, general manager of the Beaver Valley Traction Company, New Brighton, Pa., has announced the appointment of Clinton D. Smith of Youngstown, Ohio, as superintendent of the local lines. Mr. Smith has entered upon his duties with the Beaver Valley Traction Company and has been assigned offices at the Junction.

Mr. Smith was born in Harrison, N. J., on June 27, 1888. His early education was received in the public schools. Graduating from high school, he matriculated at the Worcester Polytechnic Institute, Worcester, Mass., in the department of electrical engineering, and was graduated in 1912.

Immediately afterward he became associated with the Public Service Railway of New Jersey, pursuing the railway engineering course of that company. Upon completion of the course he engaged in the duties of traffic investigator.

Mr. Smith remained with the Public Service Railway till 1916, when he accepted a position with the Pennsylvania-Ohio Electric Company, Youngstown, Ohio, as superintendent of schedules and traffic. He was promoted to superintendent of transportation in June, 1917, and to general superintendent in January, 1919.

As general superintendent Mr. Smith has been in charge of transportation, including interurban and city electric lines and interurban motor coach operation, traffic and the freight department. In the same capacity Mr. Smith has engaged actively in safety work, the promotion of good public and municipal relations and in cases coming before state utility commissions and the Interstate Commerce Commission.



C. D. Smith

F. H. Richmond has taken on the duties of general manager of the Lawton Railway & Lighting Company, Lawton, Okla., in addition to those of secretary and treasurer. He was formerly vice-president, secretary and treasurer. The position of general manager had previously been held by B. R. Stevens, who was also president and purchasing agent. Mr. Stevens continues in the capacity of president and purchasing agent.

Obituary

Joseph S. Goodwin

Joseph S. Goodwin, general manager Department of Street Railways, City of Detroit, Mich., died of heart disease at his home in that city on April 23. Mr. Goodwin was forty-six years old. Last November he was granted six months' leave of absence by the commission in the hope that the respite from active work would benefit his health, but he failed to improve during the winter months.

The squabbling with the Detroit United Railway forces in the early stages of the effort to establish the first municipal lines bore down heavily upon Mr. Goodwin. He was not built for battle. He was essentially a doer, and the truculent fighting left its mark upon the man. Then came the taking over of the private lines and the myriad of problems and added responsibilities that went with them. Mr. Goodwin had a great physique, but there are strains to which even a man so well endowed physically will succumb. He ignored the first signs of fatigue, only to be later prostrated and compelled temporarily to relinquish his active duties. Gradually, it was borne in upon Mr. Goodwin's friends that it was very unlikely he would ever be able actively to participate in business again; but even to those closest to him it was not suspected that he was fatally ill. Announcement of his death will, therefore, come as a great shock to his many friends.

Mr. Goodwin was engaged to work for the city of Detroit when the plans were being put through for building the original municipal railway system there. The brunt of the planning for this work fell upon him. Later when the arrangements were perfected under which the city took over all the local lines of the Detroit United Railway on May 15, 1922, he was made responsible for operating the entire local system. Some of the trying experiences that went with the work of planning for the construction of the original municipal system in Detroit were reviewed in the course of a personal on Mr. Goodwin in the ELECTRIC RAILWAY JOURNAL for May 20, 1922; but they were in a sense as nothing compared with the task that suddenly came upon him when he took over the lines of the private company. Among these problems was the one of selecting the personnel for the enlarged system of more than 375 miles of track. As a matter of fact, there was a dearth of men of real talent willing to become associated with the municipal enterprise, but Mr. Goodwin and those associated with him finally succeeded in mustering a competent personnel. It was his ambition to make the Detroit municipal system a success measured by the same standards as employed by private companies. He was not prone to follow the usual municipal practice of covering up losses. His plan was to introduce economies that would result in actual success, if such a thing were possible. Hence, few things have been overlooked on the Detroit Municipal Railway that would improve operating efficiency. And whatever measure of success has been attained may be credited largely to him.

Mr. Goodwin started railway work as a motorman back in 1895 on a Massachusetts property. Then he moved to Rhode Island and did the same kind of work. In 1901 he was a motorman with a road in Connecticut. Soon thereafter he became a dispatcher. Later he became manager of the Hartford & Springfield Street Railway at Warehouse Point, Conn. In 1917 he was made manager of the lines of the Connecticut Company in Bridgeport and continued in that capacity up to the time of his appointment to the Detroit post in July, 1920.

Manufactures and the Markets

News of and for Manufacturers—Market and Trade Conditions
A Department Open to Railways and Manufacturers
for Discussion of Manufacturing and Sales Matters

United States Leads in Export of Steel Rails

Since the war the United States has become the largest exporter of steel rails. Before the war Germany was the leading exporter of steel rails and the United Kingdom was second. Since that time the exports from these two countries have been markedly curtailed, leaving the United States in the lead with 71 per cent of its pre-war export tonnage. German productive capacity appears to have been impaired for some time to come, but British exports have been increasing steadily since 1919, while those from the United States have been decreasing, so that it is not impossible that the United Kingdom may soon again forge ahead of the United States as an exporter of rails.

In commenting on the situation the National Bank of Commerce of New York points out that up to about the beginning of the century the United Kingdom was easily the dominating figure in the international rail trade. Until the outbreak of the war, British exports had declined only slightly but those of the United States and Germany had increased, particularly the latter, in the years just before the war. From 1908 to 1913 German exports increased from 331,323 to 500,835 metric tons, or 51 per cent, while United States exports increased only 27 per cent from 1900 to 1913.

Formerly Argentina was Germany's chief customer, although neighboring countries of Europe were important buyers. Since the war the bulk of Germany's rail exports have gone to European countries. North Russia has been a large purchaser, and the great disorganization and destruction of Russian railways indicate that that country may be expected for some time to furnish an extensive market for rails, which Germany is conveniently located to supply.

The destinations of British exports of rails show that India continues to be by far the largest customer and 1922 purchases were in excess of the pre-war average, representing over two-fifths of total British exports as compared with less than a fourth in the pre-war years. Ceylon is the only other country enumerated which showed an increase in 1922 over the pre-war years. Exports to Argentina in 1922 were one-eighth of the pre-war average. British possessions account for the bulk of the rail exports of the country.

Japan has superseded Canada as the chief customer of the rail export trade of the United States, taking in 1922 about half of the total exports of rails. Cuba is the second largest buyer, and Canada third.

These countries are all conveniently located with relation to the United States market. Exports to Japan for the year 1922 were over four times as great as the pre-war average, while those to Canada were only a little over one-quarter and to Cuba a little over four-fifths as great. There has been a very marked falling off in exports to Argentina, Australia, Mexico, Brazil and Chile, and an increase in exports to Honduras and the United Kingdom.

There has been a change not only in the sources of rail exports since the outbreak of the war but in the chief consuming countries as well. Japan and British India are now the leading import markets. Coupled with the increase in Japanese purchases in the American market has been a marked falling off in Argentine and Australian purchases in the three countries mentioned. Indian purchases were about the same in 1922 as in the pre-war years.

British Electric Locomotives for Japan

In 1921 the Japanese State Railway authorities ordered two 59-ton freight electric locomotives from each of four firms, two American, one Swiss, and one British, the last being the English Electric Company. In June last year a contract was placed with the last-named company to supply thirty-four electric locomotives, these being the whole number required for the electrification program of the Japanese government up to the end of the year 1923. The shipping of the locomotives began in February last and will be completed by August next. This is said to be the largest contract for electric locomotives which has yet been carried out entirely by British manufacturers. The mechanical parts were built by the North British Locomotive Company, Glasgow, and the electric equipments were constructed at the Dick-Kerr Works and the English Electric Company, at Preston. Out of the total number, seventeen are for freight service, nine for local passenger trains, and eight for express passenger service. The two former types are similar except in the gear ratio, which is adjusted to give for the former a maximum speed of 40 m.p.h., and for the latter 53 m.p.h. All are for 3-ft. 6-in. gage track. These machines are of the 0-4-4-0 type and weigh 59 tons each. The trucks are articulated, so that the drawing and buffing stresses do not go through the superstructure. Direct current at 1,500 volts, with overhead wire conductors, is used, and this is taken by four motors per locomotive of 306 h.p. each. The motors are arranged in groups of two in permanent series. The control is of the English Electric Company's electrically operated cam shaft type, which provides series and parallel control and also two field shunting notches. Two or more locomotives can be coupled and worked on the multiple-unit principle. The express locomotives are of the 4-6-6-4 type. Each weighs 96 tons, and has six motors of 306 h.p. each. They are arranged in groups of two in permanent series.

Westinghouse Entertains McGraw-Hill Editors

Realizing the better service technical editors can render to their industries by closer knowledge of manufacturing problems and accomplishments, the Westinghouse Electric & Manufacturing Company entertained a group of McGraw-Hill editors at the East Pittsburgh works on April 23. Arrangements were made to give each editor the opportunity to see those engineers of the company who are handling the work in which he was particularly interested. Special shop visits were also arranged so that the editors could see equipment in course of construction. A luncheon and dinner afforded further opportunity for the editors and company engineers to get better acquainted and discuss problems of mutual interest. One or more editors from each of the fourteen McGraw-Hill papers were present.

First Electrically-Operated Train on Chilean Railway

With President Alessandri of Chile at the controller and the American Ambassador as a passenger, the first electrically-operated train on the Chilean State Railways made a successful trip on April 17 from Santiago to Tiltil and return.

This is the first step in the electrification of the 144 miles of Chile's railway, work on which is in active progress. The order for the apparatus, including thirty-three locomotives and equipment for three substations, was awarded to the Westinghouse Electric & Manufacturing Company in 1921. The contract totaled $7,000,000.

Metal, Coal and Material Prices

	April 24, 1923
Metals—New York	
Copper, electrolytic, cents per lb.	16.75
Copper wire base, cents per lb.	19.625
Lead, cents per lb.	8.00
Zinc, cents per lb.	7.37
Tin, Straits, cents per lb.	45.50
Bituminous Coal, f.o.b. Mines	
Smokeless mine run, f.o.b. vessel, Hampton Roads, gross tons	6.25
Somerset mine run, Boston, net tons	3.175
Pittsburgh mine run, Pittsburgh, net tons	2.00
Franklin, Ill., screenings, Chicago, net tons	1.95
Central, Ill., screenings, Chicago, net tons	1.575
Kansas screenings, Kansas City, net tons	2.625
Materials	
Rubber-covered wire, N. Y., No. 14, per 1,000 ft.	7.75
Weatherproof wire base, N. Y., cents per lb.	19.50
Cement, Chicago net prices, without bags	$2.20
Linseed oil (5-bbl. lots), N. Y., per gal.	$1.20
White lead, (100-lb. keg), N.Y., cents per lb.	13.375
Turpentine, (bbl. lots), N.Y., per gal.	$1.46

Rolling Stock

Elmira, Corning & Waverly Railroad, Waverly, N. Y., suffered by fire the loss of its main carhouse at South Corning on April 23. The loss is approximately fixed at $50,000. One car valued at $12,000 was lost with the repair shop, store room and machine shops.

Terre Haute, Indianapolis & Eastern Traction Company, Terre Haute, Ind., experienced a fire of undetermined origin which destroyed its carhouse at Richmond, Ind., on April 22. Fifteen cars were destroyed. The loss is more than $80,000. The carhouse for the interurban cars a short distance from the city was not damaged. Robert I. Todd, of Indianapolis, president of the company, sent several one-truck cars from the Indianapolis lines to be used temporarily at Richmond. The company recently put into service several new one-man cars at Richmond and was preparing to build others.

Pacific Electric Railway, Los Angeles, Calif., has placed on order for fifty additional multiple-unit cars for use in the Hollywood service. In the March 31 issue of the ELECTRIC RAILWAY JOURNAL, pages 561 and 562, there was a description of the new type of cars recently purchased by this company and placed in service on its Hollywood lines in Los Angeles. The new outlay of equipment will cost $887,000, and will be identical with the type of new equipment recently placed in the Hollywood service. The order, which was placed on April 19, calls for earliest possible delivery. In December, 1922, delivery of fifty new cars for the Hollywood service was completed. These cars have proved so satisfactory and the Hollywood district has been growing so rapidly that the company found it necessary to purchase fifty more cars to improve and maintain the class of service the company is desirous of giving its patrons. With the cars ordered on April 19 it will involve a total expenditure of $1,837,000 for the new equipment to serve the company's Hollywood patrons during the past year. They are equipped with four 50-hp. motors, seat sixty-five passengers, are unusually long and wide, and can be operated either in single units or in two or three-car trains. During the rush hours they are now operated in two-car trains, but upon completion of the company's new Hollywood subway for purposes of giving rapid transit between Los Angeles and Hollywood, it is planned to operate this type of new equipment in three-car trains during the peak hours.

Track and Roadway

Spokane (Wash.) United Railways will rebuild and realign 5,400 ft. of the Rockwood car line to conform to the new grade and improvement of the southeast highway connection.

Union Traction Company of Indiana, Anderson, Ind., announces that it will this summer relay its tracks with concrete on Washington Street in Marion from Fourth Street to the Pennsylvania Railroad. Work will start in a short time. Other improvements will be made by the company later.

Trenton & Mercer County Traction Corporation, Trenton, N. J., may be asked to extend its line on Hamilton Avenue from Olden to Johnston. A petition has been presented to the Mercer County Board of Freeholders asking for this improvement. The board laid the matter over. The proposed line is less than a half mile in length.

San Diego (Calif.) Electric Railway will extend the Mission Beach line from the Santa Fe station to the north end of Mission Beach, a distance of 8.08 miles. Type of construction is as follows:

Track—Double track, using 75-lb. A.S.C.E. rail with continuous joints, tie plates, redwood ties and crushed rock ballast.

Bridges—Two steel through girder bridges, 100 ft. in length, to give overhead crossings over principal highway to Point Loma, known as Tide Street, and across the main line of the Santa Fe Railway. The balance of the bridges to be open-deck pile trestles, using creosoted piling. All bridges designed for Cooper E-50 loading.

Overhead Trolley—Double pole construction from Santa Fe station to mile 3, and center pole from mile 3 to mile 6, double-pole construction from mile 6 to mile 8.08, using wood and tubular steel poles with catenary type of construction for the use of pantograph trolleys.

Distribution System—Feeder line from power station to end of line with booster substation at approximately mile 6 to permit operation of six-car trains with a five-minute headway.

Power Houses, Shops and Buildings

Pacific Electric Railway, Los Angeles, Calif., will shortly begin on the interior alterations of the Pacific Electric Building. The work involves an expenditure of approximately $375,000.

Terre Haute, Indianapolis & Eastern Traction Company, Indianapolis, Ind., has disposed of all the machinery, boilers and dynamos in the plant of the old West Indiana Utilities Company, at Brazil, which was taken over by the Terre Haute, Indianapolis & Eastern Traction Company several years ago. The plant is now being converted into a storage house. The company is rebuilding the high-tension line between Brazil and Terre Haute.

Dubuque (Ia.) Electric Company has just completed the construction of an addition 58 ft. x 67 ft. x 68 ft. to its boiler room and has installed two new 776-hp. Heine water-tube boilers with Riley underfeed stokers. The total cost was approximately $250,000. In addition a new concrete chimney has been built having an over-all height of 268 ft. and an inside diameter at the top of 13 ft. and inside diameter at the bottom of 16 ft. This installation has been made necessary by the increasing use of electricity locally and is the first step toward the complete rebuilding of the old boiler room.

United Light & Railways Company, Grand Rapids, Mich., and interests are considering the erection of a new $1,750,000 central station in the "Tri-Cities." A $308,000 turbine of 20,000-kw. capacity has been ordered for this new plant, delivery to be made in March of next year by the Westinghouse company. Condenser equipment to cost approximately $83,000 to be used in the new plant has been ordered of the C. H. Wheeler Company of Philadelphia and delivery in February of next year is expected. Negotiations are now under way for the purchase of $500,000 of additional equipment to serve Davenport, Iowa; Moline, Ill.; and Rock Island, Ill.

Trade Notes

American Copper Products Corporation, New York, N. Y., has removed its general sales offices to the twenty-sixth floor, Woolworth Building, New York.

Dwight P. Robinson & Company, Inc., New York, N. Y., announces the opening of a Philadelphia office. The new office will be under the direction of Carl A. Baer, member American Institute of Electrical Engineers, who was recently with the firm of Baer, Cook & Company, engineers, and a consulting engineer in the design of industrial, textile and power plants.

Aurora, Elgin and Chicago Railroad, Aurora, Ill., has recently placed an order for forty safety car equipments and 7 four-motor equipments for use on light-weight interurban cars. General Electric 264 motors were specified for the safety cars and the interurban equipments will be four General Electric 265 motors. The purchase of the new equipment is in line with the policy of its management to furnish up-to-date service and to take advantage of every plan to reduce operating expenses.

Georgia Railway & Power Company, Atlanta, Ga., has recently placed an order for twenty four-motor car equipments for use on light-weight double-truck cars. This is a duplicate of the order placed about a year ago. The equipment specified consists of General Electric 265 motors with B.C. type control arranged for train operation. This railway company has found train operation successful and this order is to extend that service. The cars will be built in the railway's shops.

M. M. Marcus, E. M. Met. E., has resigned as vice-president and general superintendent of the Rhode Island Malleable Iron Works to become associated with the Gulick-Henderson Company, engineers, metallurgists and chemists, as consulting engineer in charge of their foundry department. His entire time will be devoted to consulting foundry engineering. He will also continue to serve on the committee on molding sand research and the subcommittee on conservation and reclamation of molding and core sand of the National Research Council.

Like in Old Tut's Tomb

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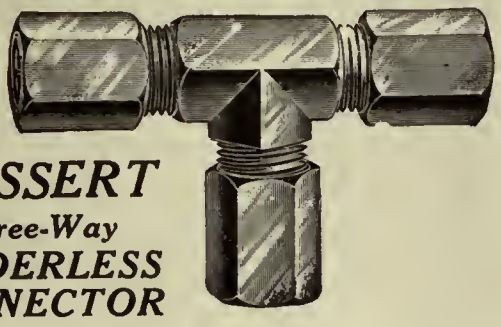
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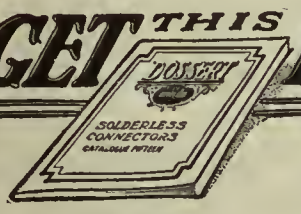
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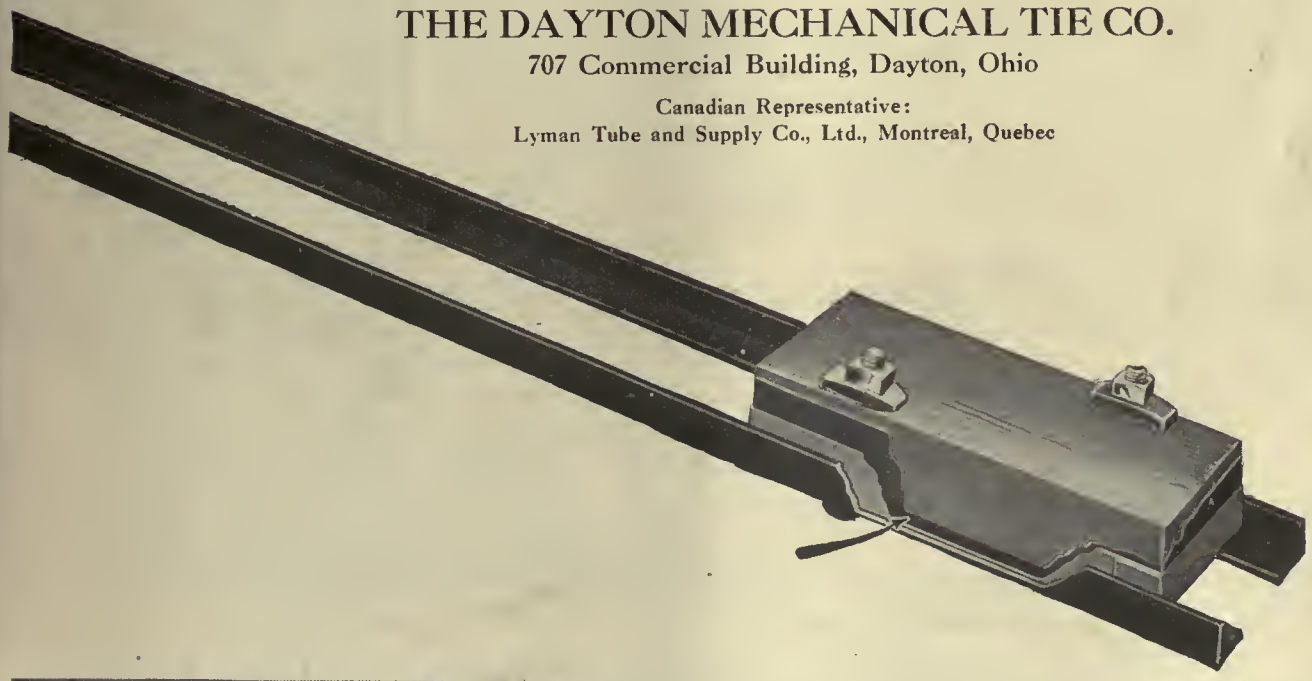
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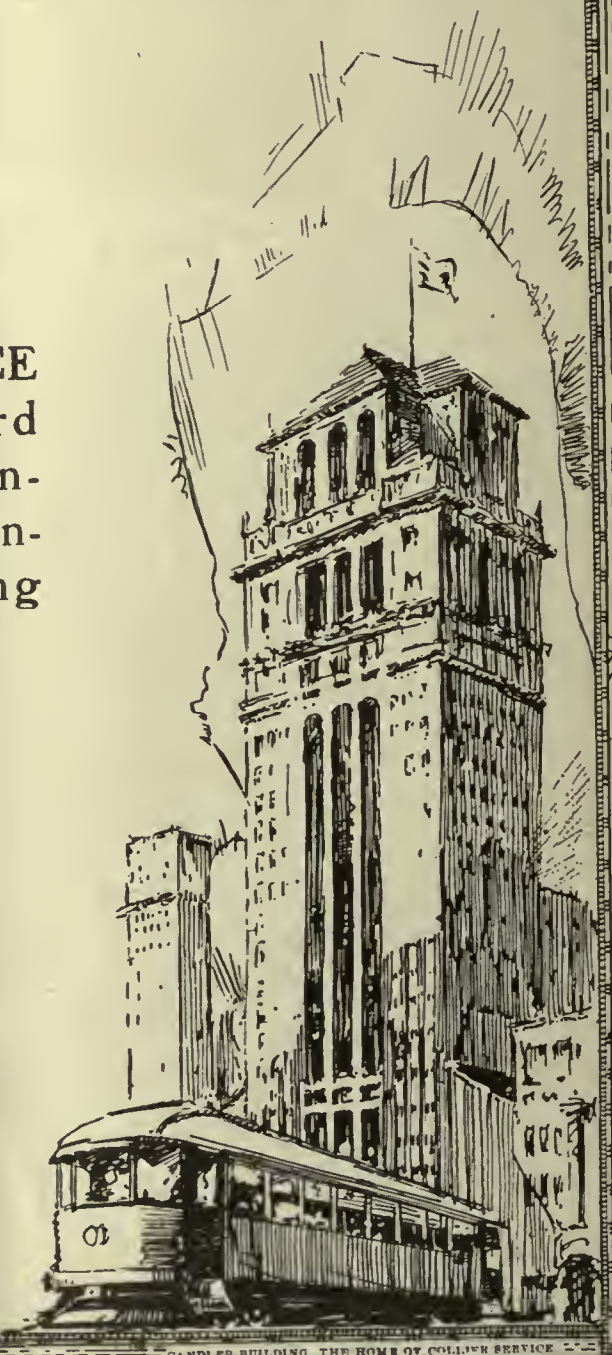
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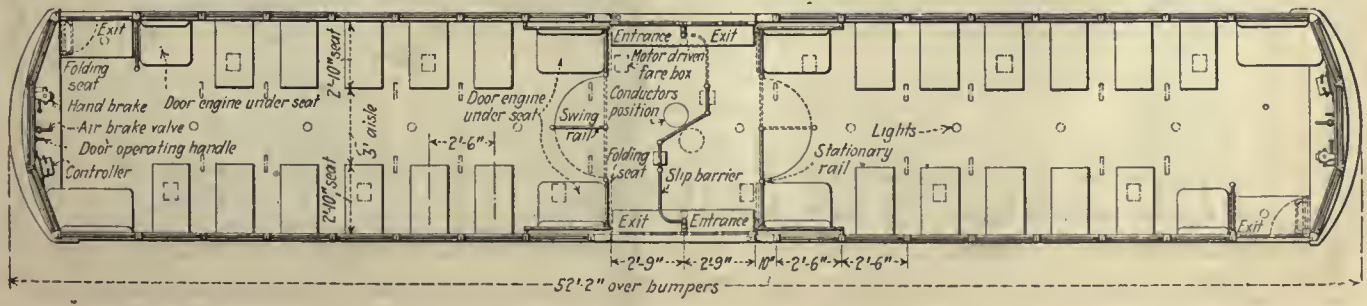
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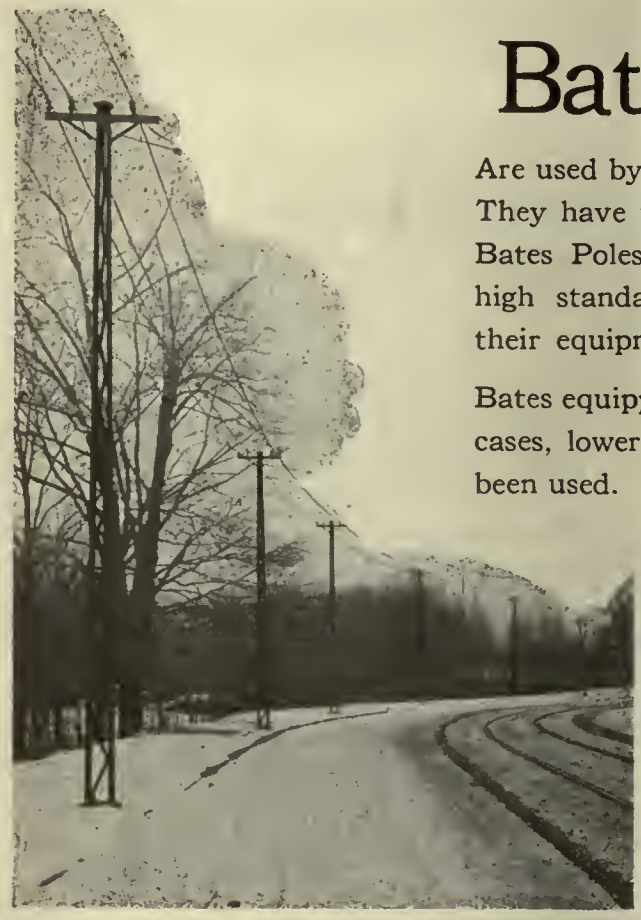
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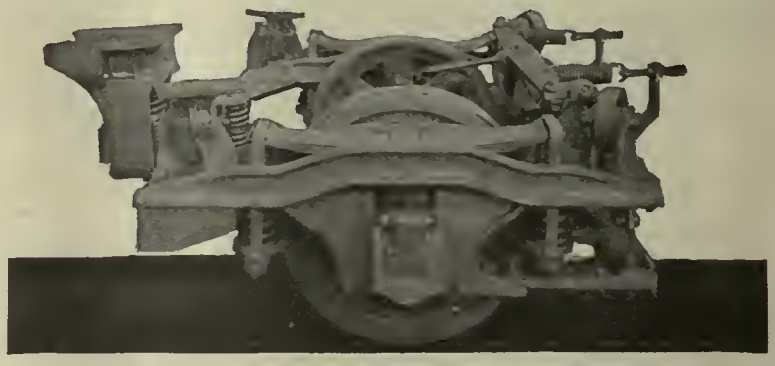
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The Electric Railway Improvement Co.
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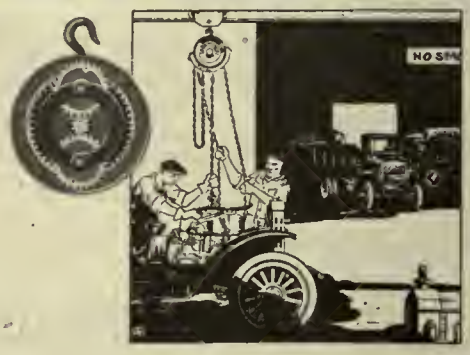
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Moore Rapid 'LECTROMELT Furnace

MAKE YOUR OWN CASTINGS
WHEN AND AS YOU NEED THEM.

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Largest Makers of Arc Furnaces in the World
PITTSBURGH, PA.

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For Accurate Placing

THE Tribloc lowers its load gently and accurately into place. To understand why, one has only to examine the planetary gear system. Such a well balanced drive insures absolute smoothness of operation. A Tribloc will never jump, jam, or jerk under its proper load.

Write for information on any type or capacity to 40 tons. 2217-D

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ALMACOA ALLIED MACHINERY COMPANY OF AMERICA ALMACOA
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High-Grade Track Work

SWITCHES—MATES—FROGS—CROSSINGS
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Cleveland, Ohio



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High-grade R. R. Track and Car Jacks

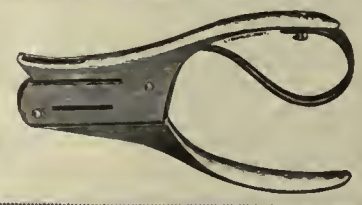
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THERMOSTAT CONTROL EQUIPMENTS

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A Style for Every Service

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A Single Segment or a Complete Commutator

is turned out with equal care in our shops. The orders we fill differ only in magnitude; small orders command our utmost care and skill just as do large orders. CAMERON quality applies to every coil or segment that we can make, as well as to every commutator we build. That's why so many electric railway men rely absolutely on our name.

Cameron Electrical Mfg. Co., Ansonia, Connecticut

"Opportunity" Advertising:

Think *"SEARCHLIGHT"* First!

"Make it of Vul-Cot Fibre"

NATIONAL VULCANIZED FIBRE CO.
WILMINGTON DELAWARE

Car Seat and Snow Sweeper *Rattan*

For 60 years we have been the largest importers of rattan from the Far East. It is therefore to be expected that when Rattan is thought of our name, "Heywood-Wakefield," instantly comes to mind.

Follow that impulse and write us when in the market for:

High Grade close woven Rattan Car Seat Webbing, canvas lined and unlined, in widths from 12 in. to 48 in.

High Grade Snow Sweeper Rattan in Natural and Cut Lengths.

High Grade Car Seats, cross or longitudinal, covered with Rattan, Plush or Leather.

HEYWOOD-WAKEFIELD COMPANY

Factory: Wakefield, Mass.

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Heywood-Wakefield Co. 1415 Michigan Ave., Chicago
E. F. Boyle, Monadnock Bldg., San Francisco, Cal.
F. N. Grigg, 630 Louisiana Ave., Washington, D. C.
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IF YOU CAN'T USE IT
Sell It

The equipment you do not need can usually render good service elsewhere. You can reach the largest group of buyers of such equipment at small cost through an ad in the

SEARCHLIGHT SECTION
For Every Business Want
"Think* SEARCHLIGHT *First"

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MAIL THAT ORDER TO NIC



Type R-11

International Registers

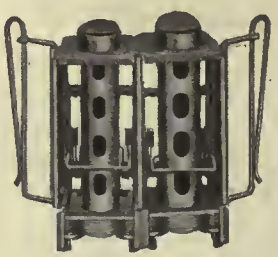
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Complete line of registers, counters and car fittings.

Exclusive selling agents for HEEREN ENAMEL BADGES.

The International Register Co.
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JOHNSON Universal Changer



Adjustable

The best changer on the market. Can be adjusted by the conductor to throw out a varying number of coins, necessary to meet changes in rates of farea.

Flexible

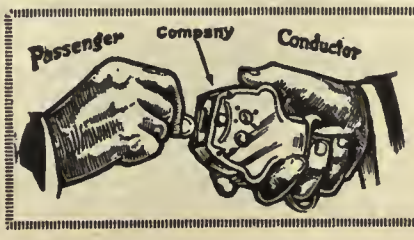
Each barrel a separate unit, permitting the conductor to interchange the barrels to suit his personal requirements, and to facilitate the addition of extra barrels.

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Fare Boxes *Change Carriers*

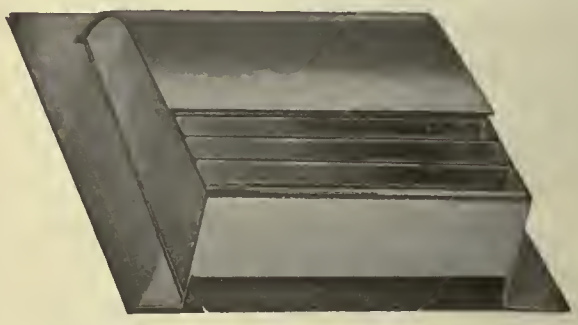
COIN
COUNTERS SORTERS WRAPPERS

THE CLEVELAND FARE BOX CO.
CLEVELAND, OHIO
Canadian Branch, Preston, Ontario.



Direct Automatic Registration
By the Passengers
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THE N-L New Style Type C Ventilator is absolutely weatherproof, lays low on roof, looks well and meets every requirement of ventilation.

More than seven thousand N-L Ventilators sold during 1922.

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N-L Products manufactured and sold in Canada by
Railway and Power Engineering Corporation, Ltd.,
133 Eastern Avenue, Toronto, Ontario

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National Railway Appliance Co.

Grand Central Terminal, 452 Lexington Ave., Cor. 45th St., New York

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Andersun Slack Adjusters
Genesco Paint Oils
Dunham Hopper Door Devices
Anglo-American Varnish Co., Varnishes, Enamels, etc.
Drew Line Material and Railway Specialties
Turnstile Car Corporation Turnstiles
National Hand Holds
Pittsburgh Forge & Iron Co.'s Products
Economy Electric Devices Co., Power Saving & Inspection Meters
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C-H Electric Heaters
Garland Ventilators
National Safety Car Equipment Co.'s One-Man Safety Cars
Fluxlinum Insulation
E-Z Car Control Corporation Safety Devices
Tnemec Paint & Oil Co.'s Cement Paint
Fort Pitt Spring & Mfg. Co., Springs

Ajax Perfecto Bronze Check Plates

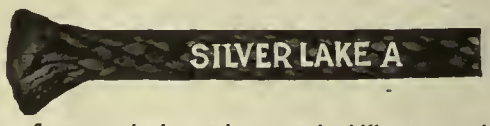


Made from our Perfecto Bronze — the strongest and toughest metal on the market; will bend before it will break. Withstands shocks therefore, and outlasts all other check plates several times.

Specify Ajax Perfecto Bronze on your next requisition.

The Ajax Metal Company
Established 1880
Main Office and Works: **Philadelphia, Pa.**

Waterproofed Trolley Cord



Is the finest cord that science and skill can produce. Its wearing qualities are unsurpassed.

FOR POSITIVE SATISFACTION ORDER SILVER LAKE

If you are not familiar with the quality you will be surprised at its **ENDURANCE and ECONOMY.**

Sold by Net Weights and Full Lengths

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Manufacturers of bell, signal and other cords.
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Car Heating and Ventilation

is one of the winter problems that you must settle without delay. We can show you how to take care of both, with one equipment. Now is the time to get your cars ready for next winter. Write for details.

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RAILWAY UTILITY COMPANY

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"HONEYCOMB" AND "ROUND JET" VENTILATORS
for Monitor and Arch Roof Cars, and all classes of buildings;
also **ELECTRIC THERMOMETER CONTROL**
of Car Temperatures.

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Car Seating, Broom and Snow Sweeper Rattan, Mouldings, etc.

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AMERICAN means QUALITY
RATTAN SUPPLIES OF EVERY DESCRIPTION



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Sells Transportation

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PEREY TURNSTILES
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Use them in your Prepayment Areas and Street Cars

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100 New Users in the Last Nine Months
KASS SAFETY TREADS
HIGH
in efficiency and lasting qualities
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in weight, initial and upkeep costs
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SEARCHLIGHT SECTION

POSITIONS VACANT

ACCOUNTANT—Experienced in accounting under text of Interstate Commerce Commission and familiar with depreciation accounts for electric street railways. Must also have had experience in Federal Taxation and office management. State present and former connections, present salary, salary desired and reason for change. Communications will be treated strictly confidential. Address P-545, Electric Railway Journal, 10th Ave. at 36th St., New York.

FIRST-CLASS draftsman wanted for street railway master mechanic's office. Must be competent in car design and should have some mechanical and electrical engineering ability. P-542, Elec. Ry. Journal, Real Estate Trust Bldg., Phila., Pa.

LINE Superintendent wanted for an Eastern company operating fifty miles of transmission lines within an area of forty square miles. Must be familiar with high voltage work and be able to handle men efficiently. Give reference and salary expected with first letters. P-540, Electric Railway Journal, 10th Ave. at 36th St., New York.

WANTED at good salary, competent formmaker to repair and build new armature coil forms. In applying give experience and references. (Signed) National Armature & Electric Works, Bluefield, W. Va.

POSITIONS WANTED

ACCOUNTING executive, thoroughly experienced in all branches of large properties: street railway, light, power and gas utility, open for engagement. Capable of assuming full control of all accounting work. PW-543, Elec. Ry. Journal, Old Colony Bldg., Chicago, Ill.

SUPERINTENDENT of transportation. Twenty years' experience in electrical line, operating city, interurban and suburban property. Good record based on long experience with large property. Present relations are pleasant, personal reasons for desiring a change. PW-533, Electric Railway Journal, Old Colony Bldg., Chicago, Ill.

SUPERINTENDENT of transportation with a proven successful record of 18 years on large city, suburban and interurban properties, at present employed, desires a change and will consider any property that needs a practical, progressive, efficient transportation man who is capable of taking over all details of transportation and handling same in a manner that will get results and be a credit to any property. Present relations are pleasant. Personal reasons for desiring a change. High grade references as to character and ability. Would prefer city and suburban property. Address with details PW-544, Elec. Ry. Journal, 10th Ave. at 36th St., New York.

FOR SALE

G. E. CO. ROTARY CONVERTER

60 cy., 13,200 or 6600 v. A.C. to 590 v. D.C., 2200 kw.

Includes the following:

Item 1—Type HCC, 16 pole, 2200 kw., 450 r.p.m., 590 v. Synchronous Converter with booster and instruments.

Item 2—3 type WC, 60 cy., 900 kva., 13,200-6600 v. primary, 368 v. secondary, water-cooled Transformers with 10% taps above and below normal and 50% starting tap.

Item 3—Complete 3 panel switchboard for the above. Built 1917

Has been run only for test—prompt shipment—attractive price

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Apply General Chemical Company

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20—Peter Witt Cars

Weight Complete, 33,000 lbs.

Seat 53, 4—G. E. No. 258-C Motors. K-12-H Control, West. Air Taylor Trucks. R.H. Type. Complete.

ELECTRIC EQUIPMENT CO.
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ROTARY CONVERTER

1—300-kw., 25-cy. West. Will sell or trade for 60-cy. Converter of same capacity.

KANKAKEE & URBANA TRACTION CO.
Urbana, Ill.

FOR SALE

38 GE 216 Motors

Transit Equipment Company
Cars—Motors
501 Fifth Avenue, New York.

FOR SALE

Street Cars and Parts

The Commission offers for sale the following complete street cars, car bodies, trucks, motors, etc. Sealed Tenders addressed to the Chairman, endorsed "Tender for Street Cars and Parts" will be received until noon of

May 12th, 1923

at the offices of the Commission, Public Utilities Building, 35 Yonge St., Toronto, Ontario. A cheque for 5% of the amount of the offer, payable to "The Toronto Transportation Commission," drawn on and accepted by a Canadian chartered bank, must accompany each Tender. Tenders for the whole or part of the lot offered will be received. The cars and materials offered are now on the Commission's property in Toronto, and Tenders must be based on acceptance as and where the cars and materials are located.

50	Single-truck cars complete with G.E.-67 motors.
6	Single-truck cars complete with G.E.-1000 motors.
1	Brill M.T. truck car complete with G.E.-67 motors.
2	Single truck trailer cars complete. Also 11 single-truck motor car bodies and trucks (no motors).
7	Double-truck closed motor car bodies (no motors or trucks).
10	Single-trucks (no bodies) with G.E.-1000 motors; 6 G.E.-1000 motors and 6 pairs of wheels (no trucks nor bodies).

A condition of the acceptance of any Tender is that the cars or materials must be removed by the tenderer from the property of the Commission within one calendar month from date of notification of acceptance from the Commission to the Tenderer by registered mail.

Copies of a detailed inventory may be secured and appointments to inspect may be arranged through the Executive Department, Public Utilities Building, 35 Yonge St., or the Rolling Stock Department, 4 Sherbourne Street.

The highest or any tender not necessarily accepted.

H. H. COUZENS,
General Manager,

TORONTO TRANSPORTATION COMMISSION.



No. 201—2—3—6.
4—45-ft. Interurban Passenger and Baggage Cars—Wood Body, End Entrance, Cane Seat, Monitor Roof Motor G.E. 57, Quadruple, 2-Turn Control Westinghouse, K-14, Single End. Brakes, Westinghouse, Compressors, Nat. Brake & Electric Co. B.B. 2 Baldwin Trucks, 34-in. Wheels, 4½-in. Axles, Each $2,000.00.



No. 207.
Interurban Passenger and Baggage, All Steel Center Entrance, 51-ft. Car. Motor, Westinghouse, 306 V 4 Quadruple. Control Westinghouse H.L., Brakes, Westinghouse, with Nat. Brake Compressor, B.B.2, Baldwin Trucks, 34-in. Wheels, 5-in. Axles, $4,500.00.

Ten other cars in very good condition are covered by our Bulletin—mailed upon request.

BUFFALO HOUSE WRECKING & SALVAGE CO.

Buffalo, N. Y. **Phone, Fillmore 1856**

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Equipment, Apparatus and Supplies Used by the Electric Railway Industry with Names of Manufacturers and Distributors Advertising in this Issue

Advertising, Street Car
Collier, Inc., Barron G.
Air Receivers, Aftercoolers
Ingersoll-Rand Co.
Anchors, Guy
Electric Service Sup. Co.
Ohio Brass Co.
Standard Steel Works Co.
Westinghouse E. & M. Co.
Armature Shop Tools
Electric Service Sup. Co.
Automatic Return Switch Stands
Ramapo Ajax Corp.
Automatic Safety Switch Stands
Ramapo Ajax Corp.
Axles
Bemis Car Truck Co.
St. Louis Car Co.
Standard Steel Works
Axles, Car Wheel
Bemis Car Truck Co.
Brill Co., The J. G.
Carnegie Steel Co.
Westinghouse E. & M. Co.
Axle Straighteners
Columbia M. W. & M. I. Co.
Babbitt Metal
Ajax Metal Co.
More-Jones Br. & Metal Co.
Babbitting Devices
Columbia M. W. & M. I. Co.
Badges and Buttons
Electric Service Sup. Co.
Internat'l Register Co., The
Bearings an Bearing Metals
Ajax Metal Co.
Baldwin Locomotive Works
Bemis Car Truck Co.
Columbia M. W. & M. I. Co.
General Electric Co.
Gilbert & Sons, B. F. A.
Le Grand, Inc., Nic
More-Jones Br. & Metal Co.
Westinghouse E. & M. Co.
Bearings Center and Roller Side
Stucki Co., A.
Bearings, Roller
Stafford Roller Bearing Car Truck Corp.
Bells and Gongs
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
Consolidated Car-Heating Co.
Electric Service Sup. Co.
Boilers
Babcock & Wilcox Co.
Bonding Apparatus
American Steel & Wire Co.
Electric Railway Improvement Co.
Electric Service Sup. Co.
Indianapolis Switch & Frog Co.
Ohio Brass Co.
Railway Track-work Co.
Bonds, Rail
American Steel & Wire Co.
Electric Railway Improvement Co.
Electric Service Sup. Co.
General Electric Co.
Indianapolis Switch & Frog Co.
Ohio Brass Co.
Railway Track-work Co
Westinghouse E. & M Co.
Brackets and Cross Arms (See also Poles, Ties Posts, etc.)
Bates Exp. Steel & Tr. Co.
Electric Ry. Equip. Co.
Electric Service Sup. Co.
Hubbard & Co.
Ohio Brass Co.
Brake Adjusters
National Ry. Appliance Co.
Westinghouse Tr. Br. Co.
Brake Shoes
Amer. Br. Shoe & Fdry. Co.
Barbour-Stockwell Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
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Ackley Brake & Supply Corp.
Allis-Chalmers Mfg. Co.
Bemis Car Truck Co.
Brill Co., The J. G.
Columbia M. W. & M. I. Co.
General Electric Co.
Johns-Manville, Inc.
National Brake Co.
Safety Car Devices Co.
Westinghouse Tr. Br. Co.
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Amer. Rattan & Reed Mfg. Co.
Brushes, Carbon
General Electric Co.
Jeandron, W. J.
Le Carbone Co.
U. S. Graphite Co.
Westinghouse E. & M. Co.
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U. S. Graphite Co.
Brush Holders
Anderson Mfg. Co., A. & J. M.
Columbia M. W. & M. I. Co.
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Ingersoll-Rand Co.
Buses, Motor
Brill Co., The J. G.
St. Louis Car Co.
Bushings
National Vulcanized Fibre Co.
Bushings, Case Hardened and Manganese
Bemis Car Truck Co.
Brill Co., The J. G.
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Hale & Kilburn
Heywood-Wakefield Co.
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Cambric, Tapes, Yellow and Black Varnished
Irvington Varnish & Ins. Co.
Carbon Brushes (See Brushes Carbon)
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Car Panel Safety Switches
Consolidated Car Heating Co.
Westinghouse E. & M. Co.
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Differential Steel Car Co.
St. Louis Car Co.
Cars, Gas Rail
St. Louis Car Co.
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Wood Co., Chas. N.
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Circuit Breakers
General Electric Co.
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Anderson Mfg. Co., A. & J. M.
Dossert & Co.
Electric Ry. Equip. Co.
Electric Service Sup. Co.
General Electric Co.
Hubbard & Co.
Ohio Brass Co.
Westinghouse E. & M. Co.
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Ohio Brass Co.
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General Electric Co.
Coal and Ash Handling (See Conveying and Hoisting Machinery)
Coil Banding and Winding Machines
Columbia M. W. & M. I. Co.
Electric Service Sup. Co.
Coils, Armature and Field
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General Electric Co.
Rome Wire Co.
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Westinghouse E. & M. Co.
Coin-Counting Machines
Cleveland Fare Box Co.
Electric Service Sup. Co.
Internat'l Register Co., The
Johnson Fare Box Co.
Coin Sorting Machines
Cleveland Fare Box Co.
Coin Wrappers
Cleveland Fare Box Co.
Commutator Slotters
Electric Service Sup. Co.
General Electric Co.
Westinghouse E. & M. Co.
Commutator Truing Devices
General Electric Co.
Commutators or Parts
Cameron Elec'l Mfg. Co.
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General Electric Co.
Ingersoll-Rand Co.
Westinghouse Tr. Br. Co.
Compressors, Air, Portable
Ingersoll-Rand Co.
Condensers
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Electric Service Sup. Co.
Internat'l Register Co., The
Roebling's Sons Co., J. A.
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Silver Lake Co.
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Couplers, Car
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Ohio Brass Co.
Westinghouse Tr. Br. Co.
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Crushers, Rock
Allis-Chalmers Mfg. Co.
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Morton Mfg. Co.
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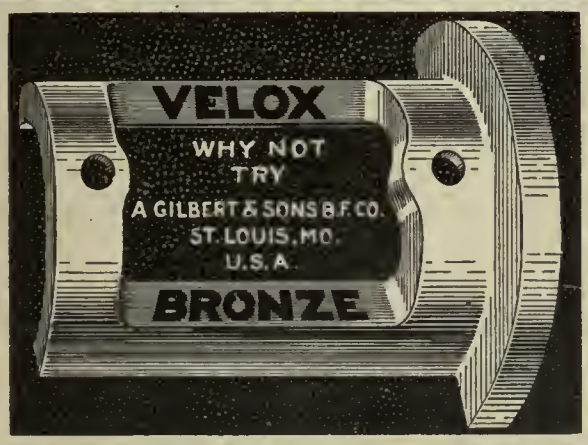


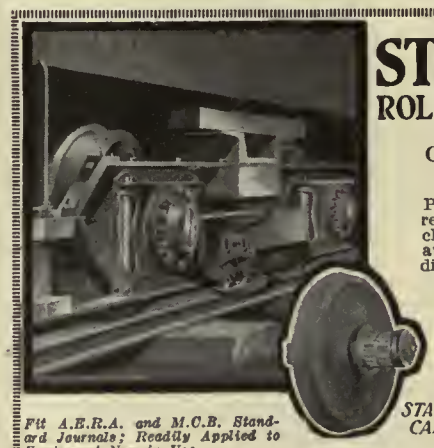
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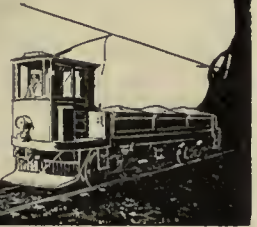
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